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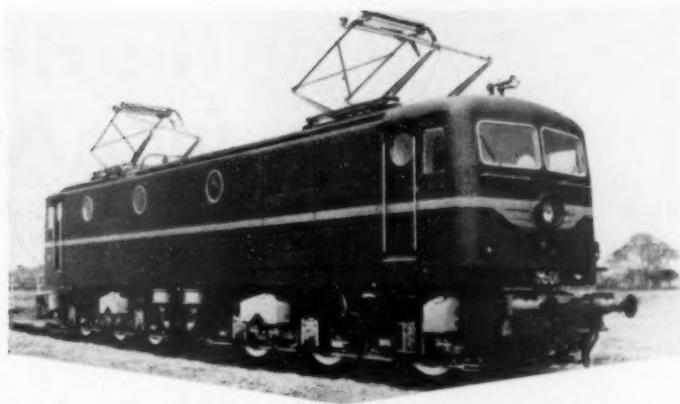
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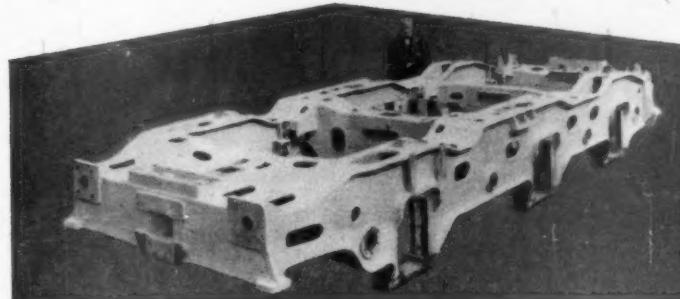
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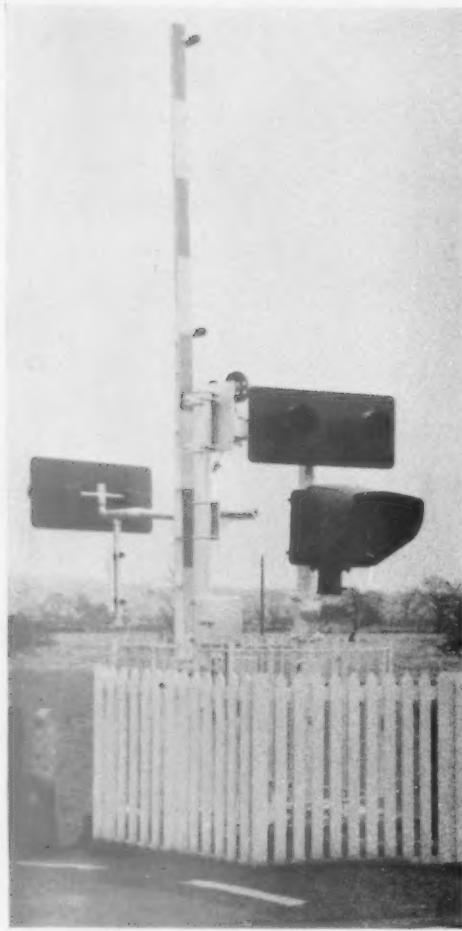


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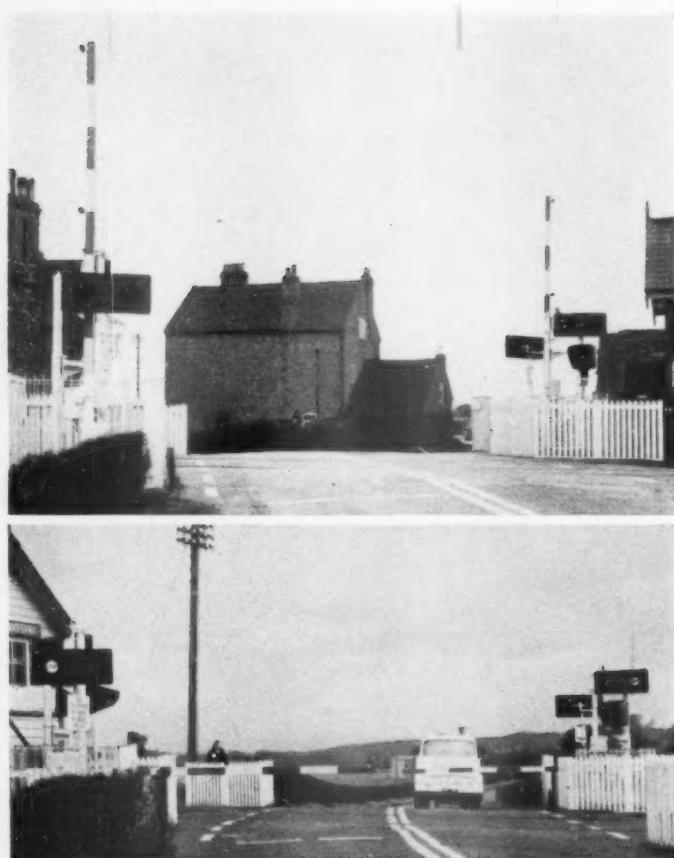
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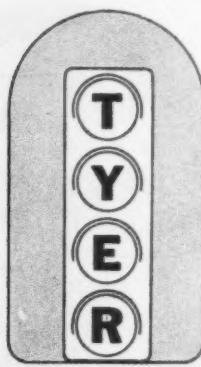
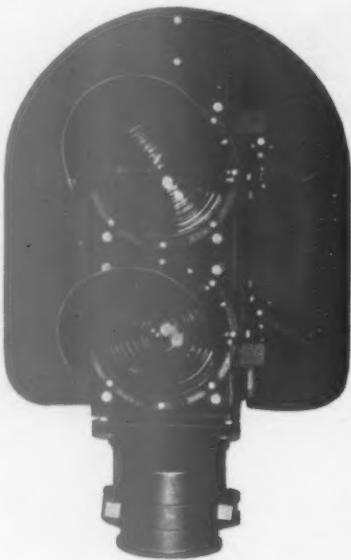


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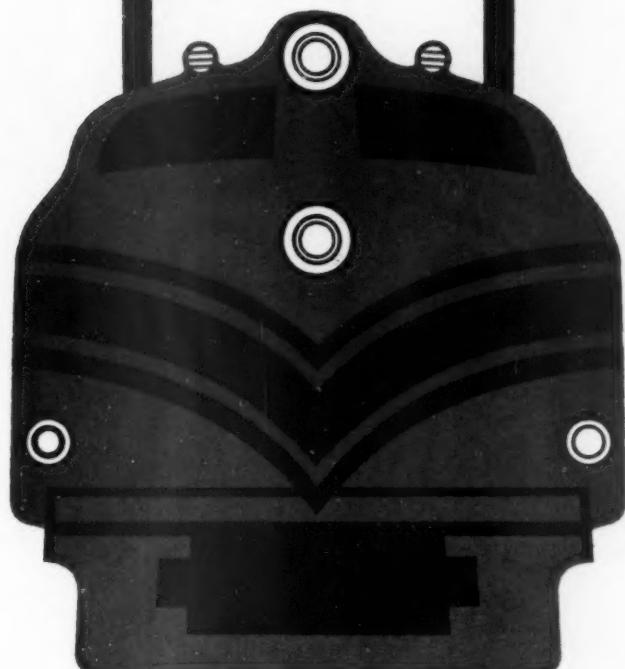
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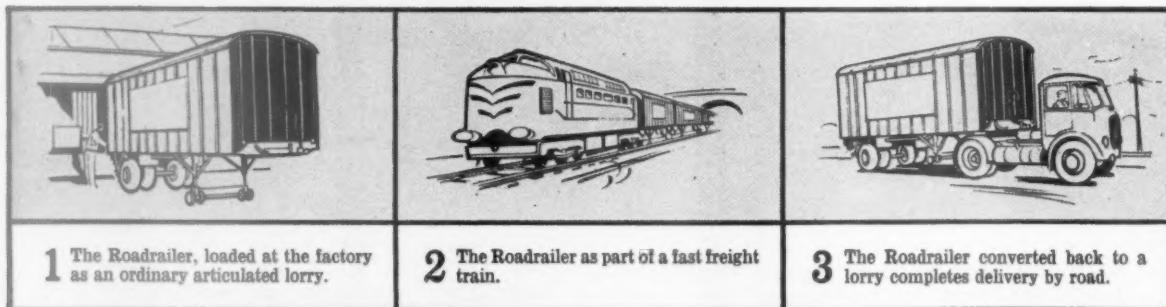


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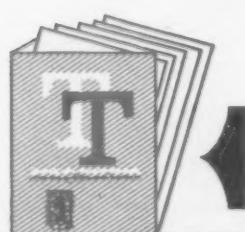


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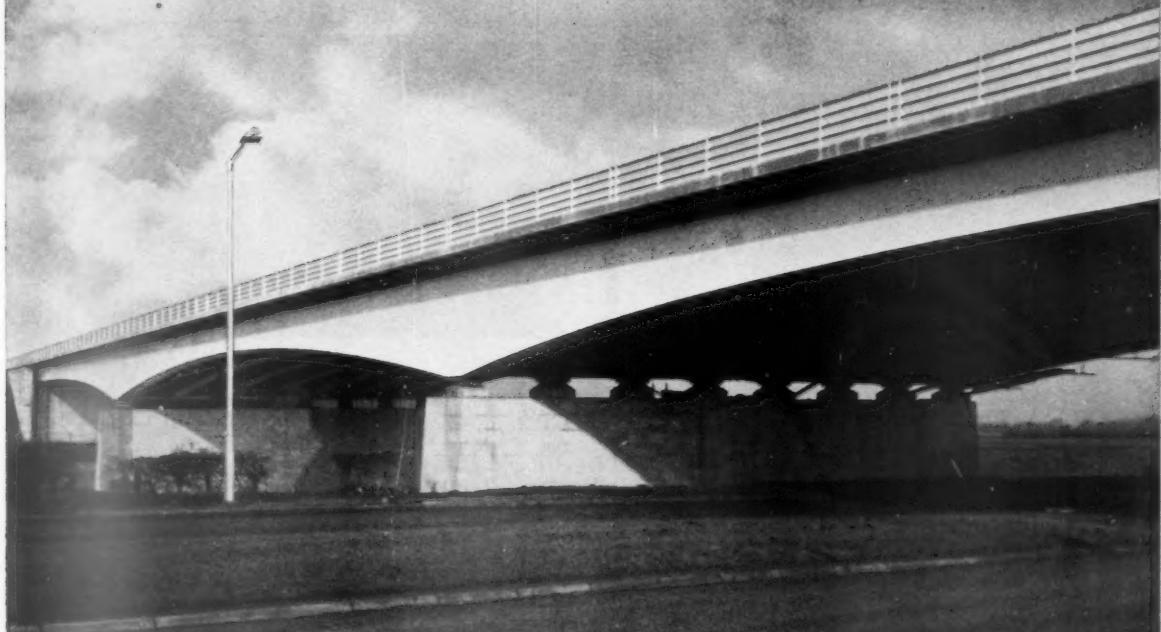
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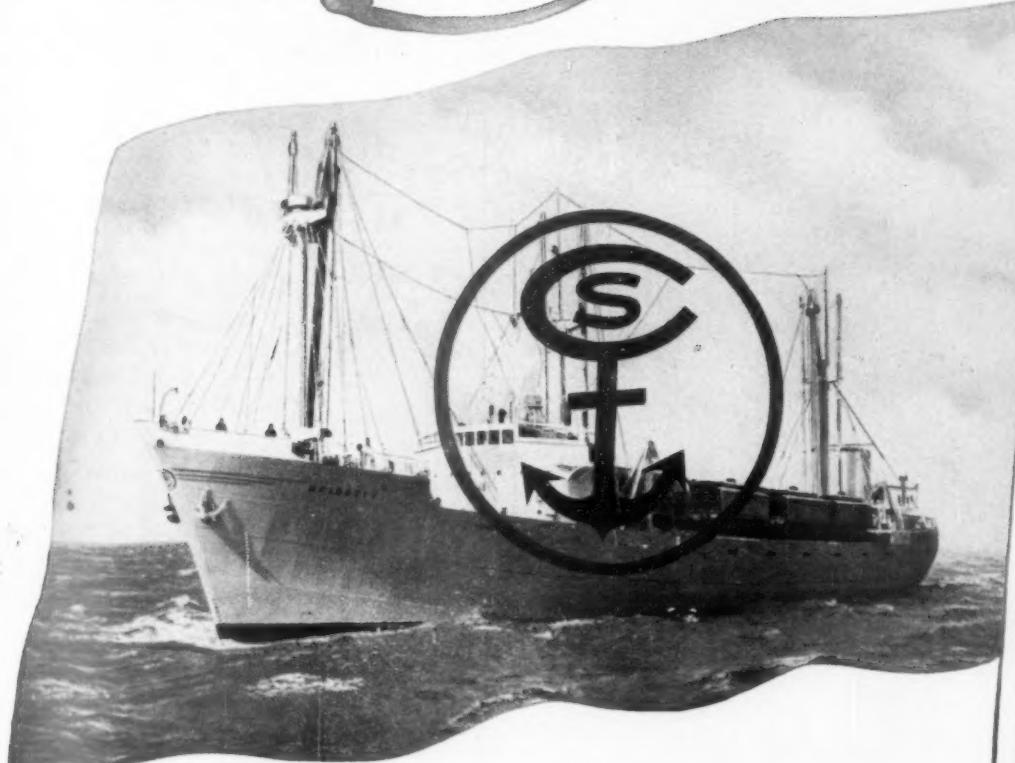
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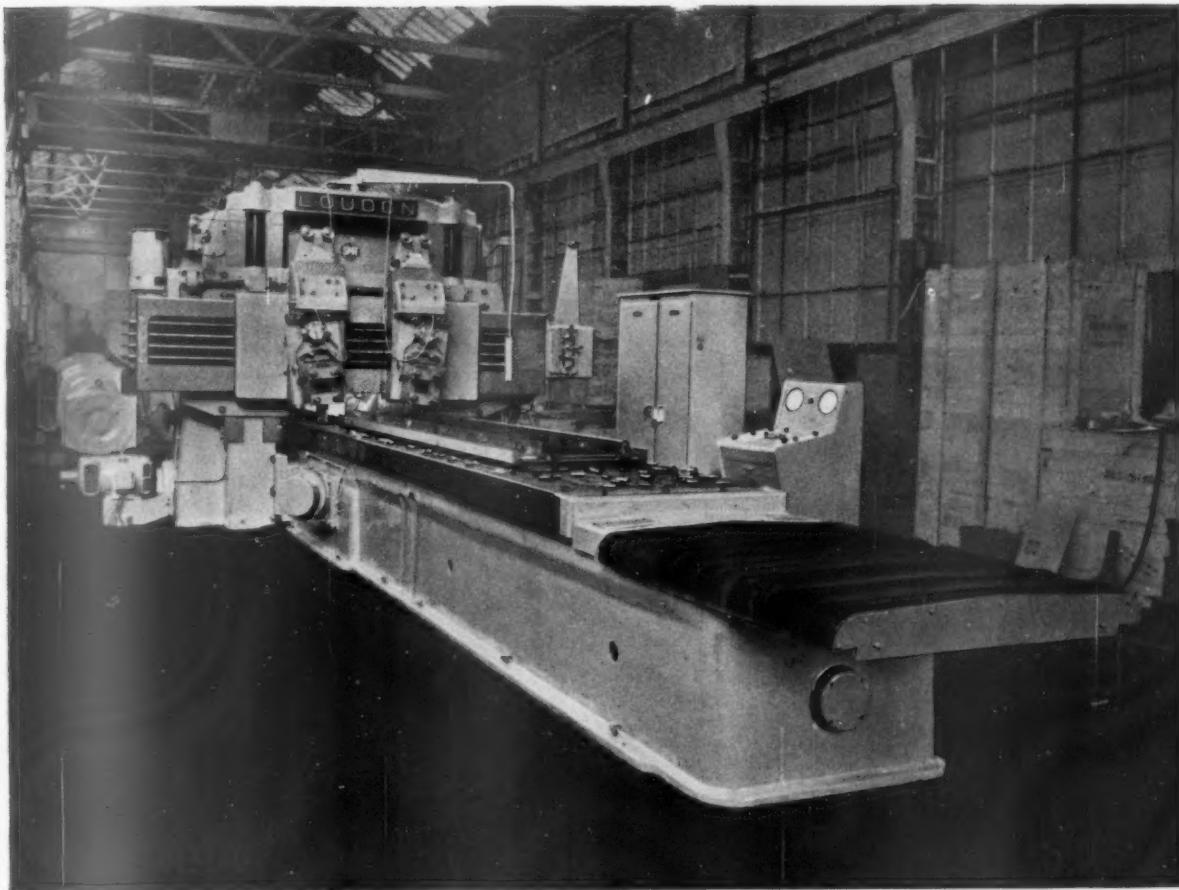
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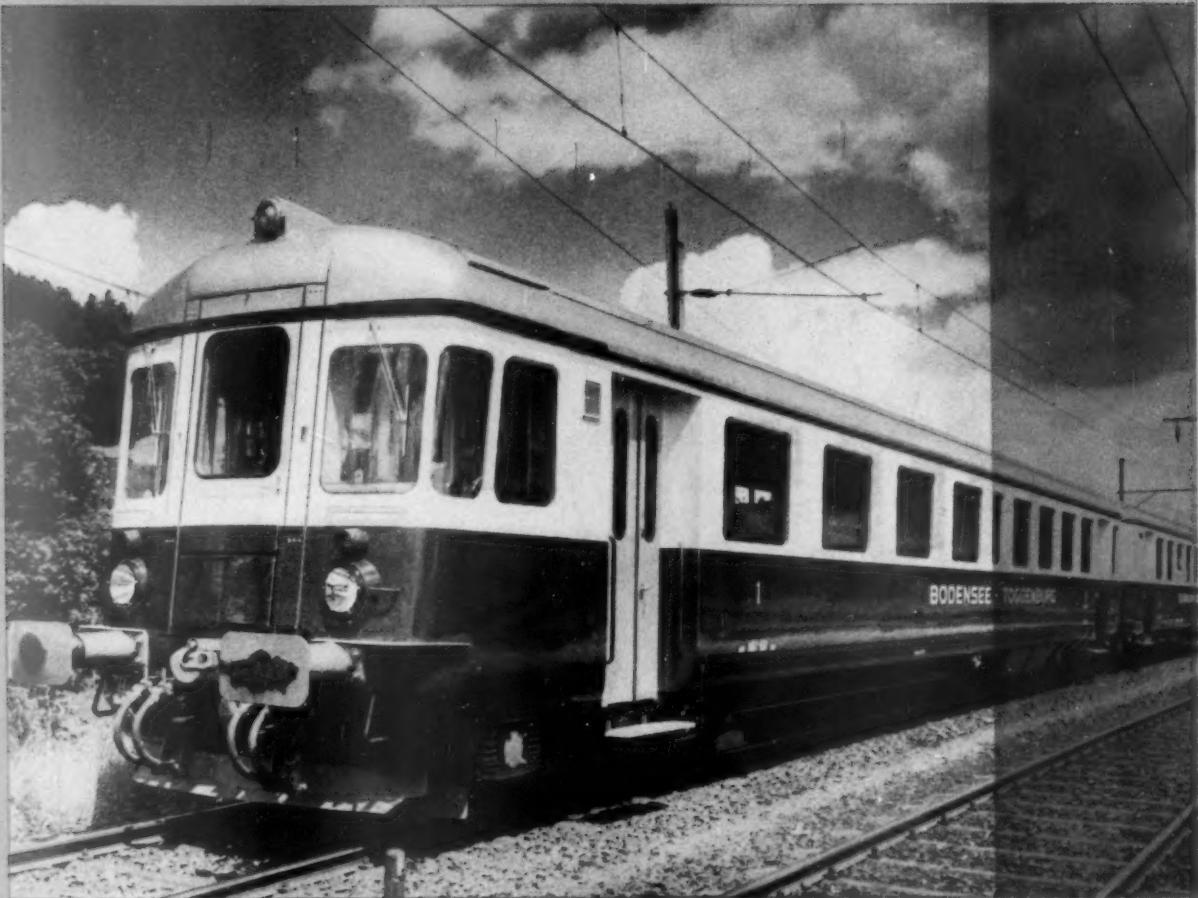
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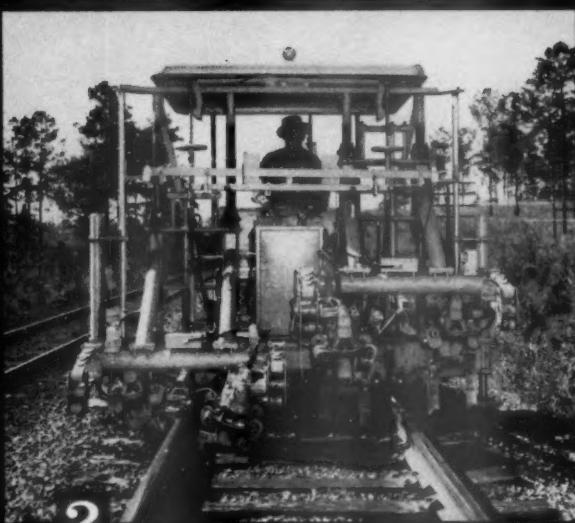
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1



2



3

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'Alfloc'



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Photograph: courtesy of the Royal Geographical Society

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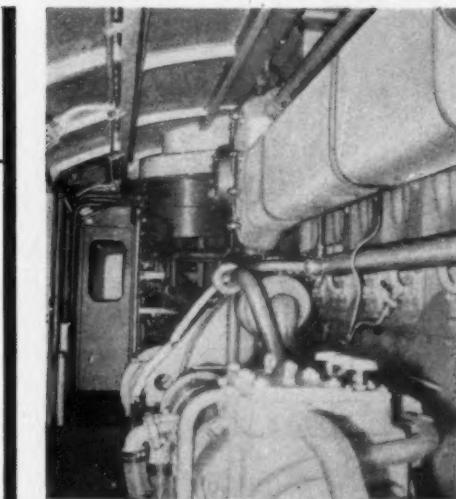


A 450 ton load at 70km/h !

Thailand's narrow railway gauge (1 metre) called for special consideration in the design of 950 H.P. diesel-electric locomotives for her State Railways. Maximum permissible axle load was 12 tons, and the restricted body width entailed a special arrangement of mechanical and other parts.

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The right-angle drive, which now has so many applications for diesel and electric traction, is a job for the specialist.

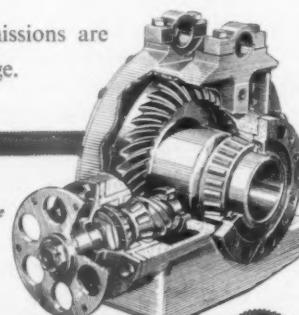
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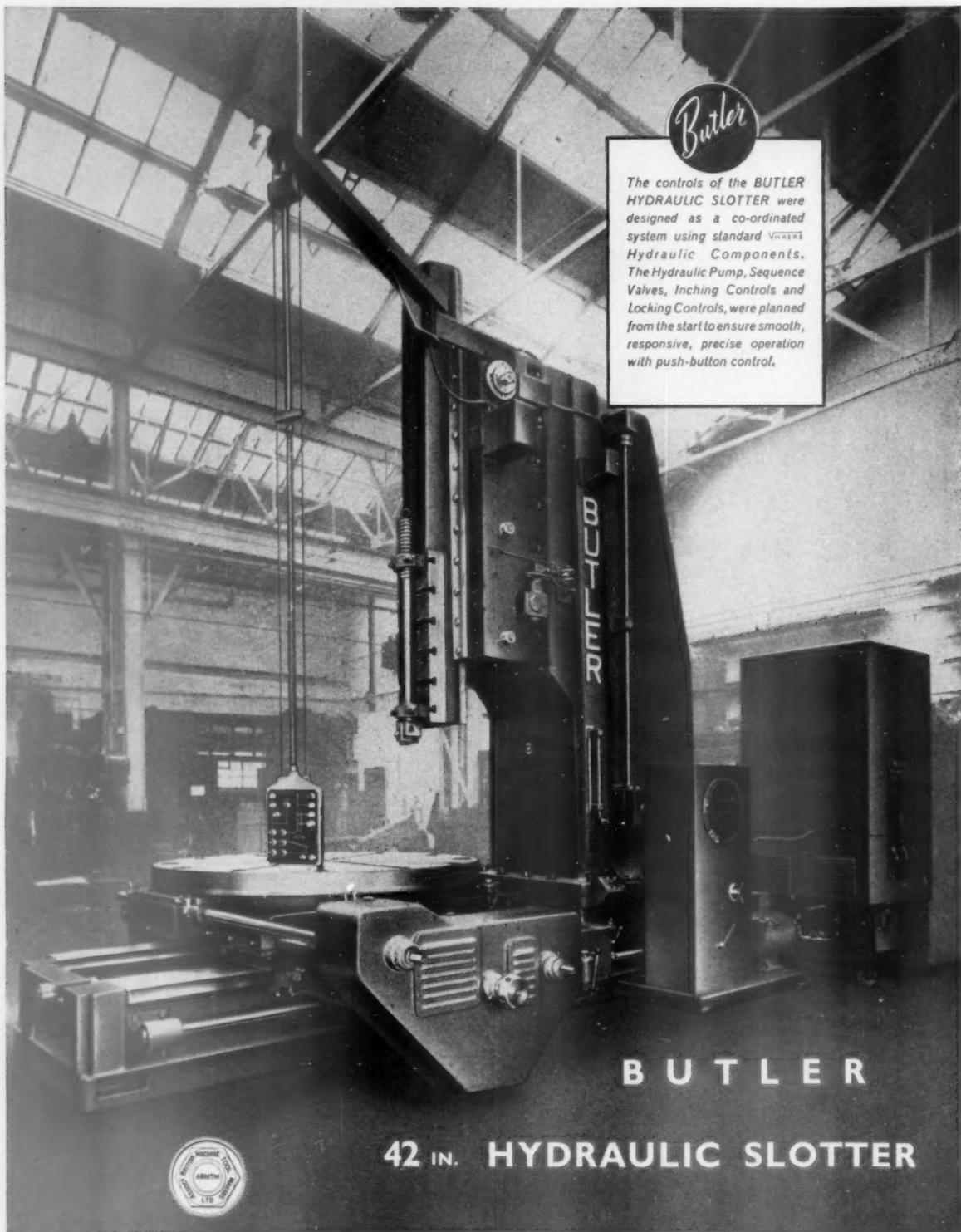
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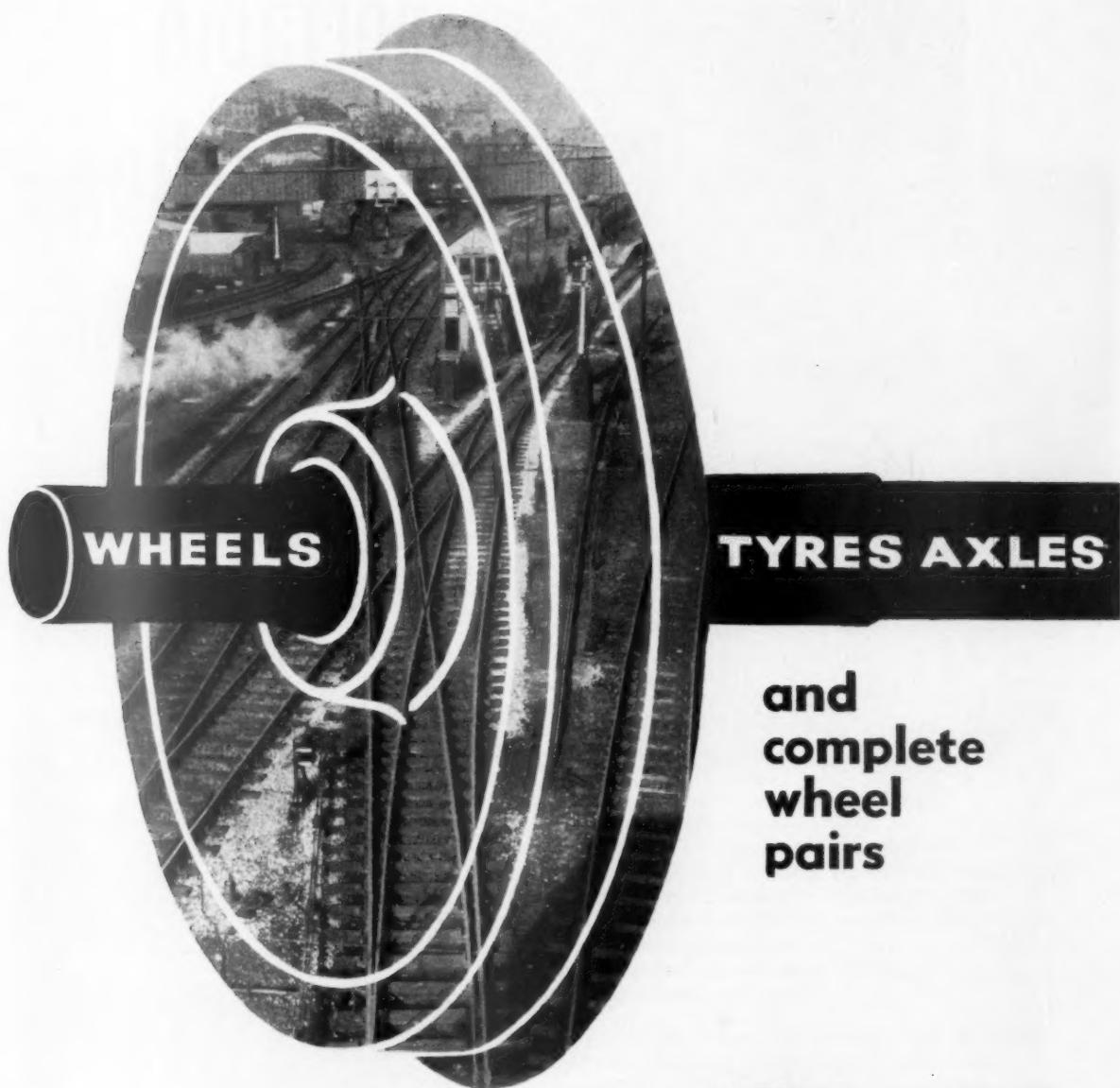
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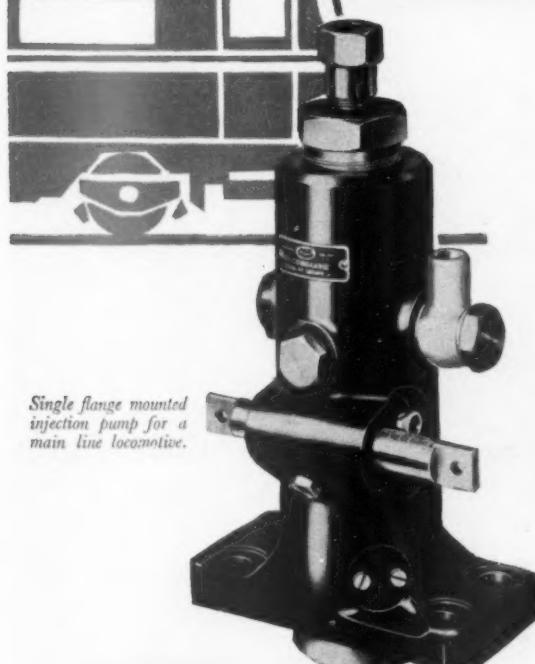
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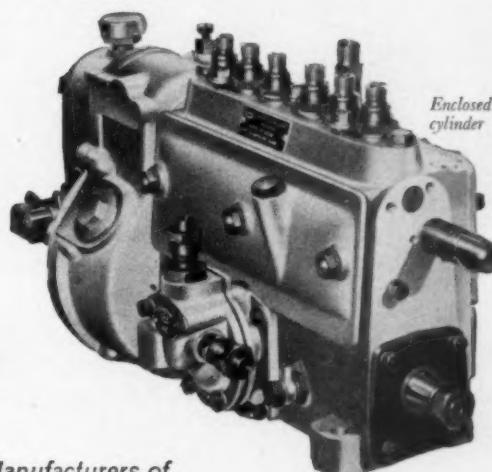
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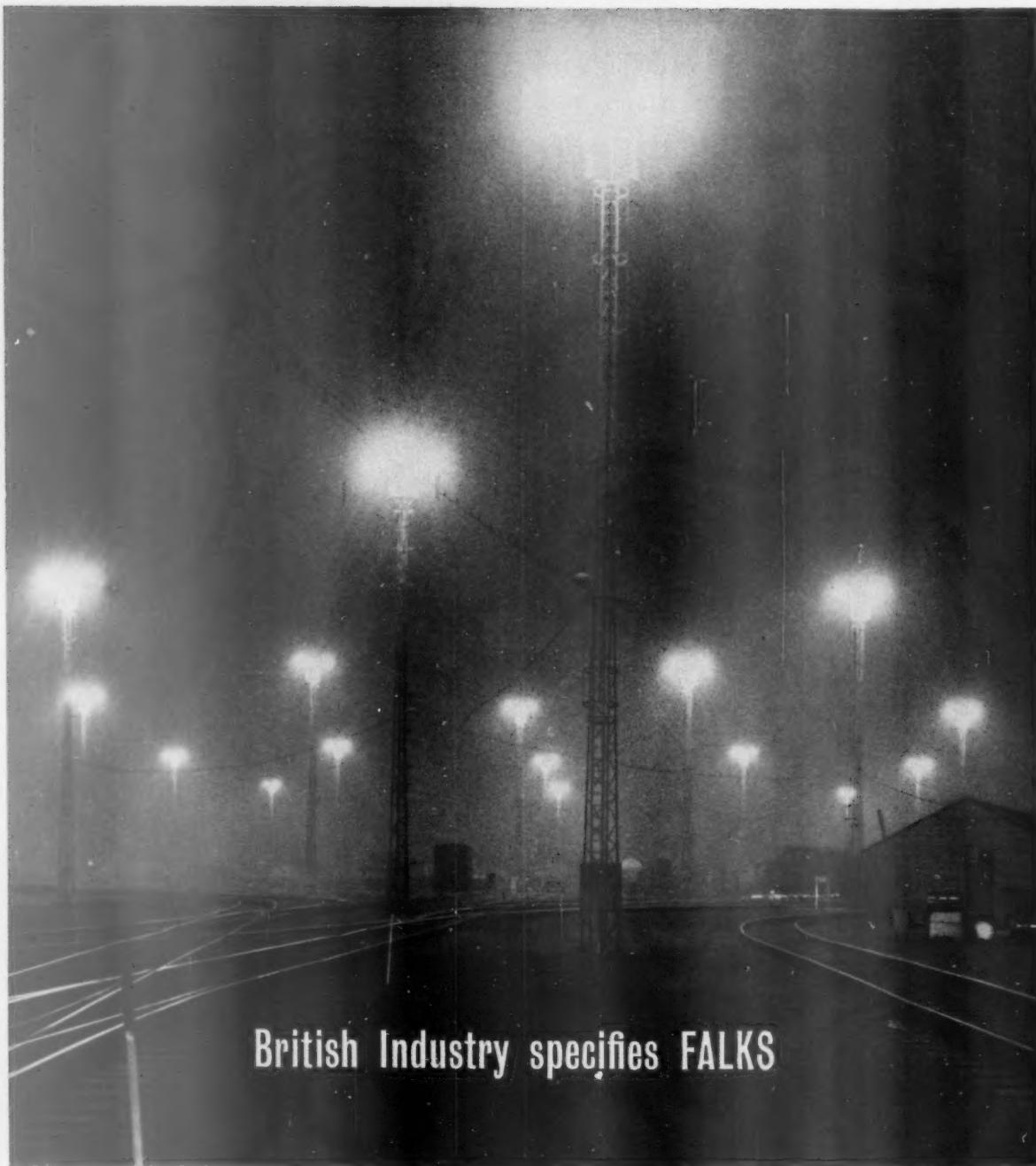
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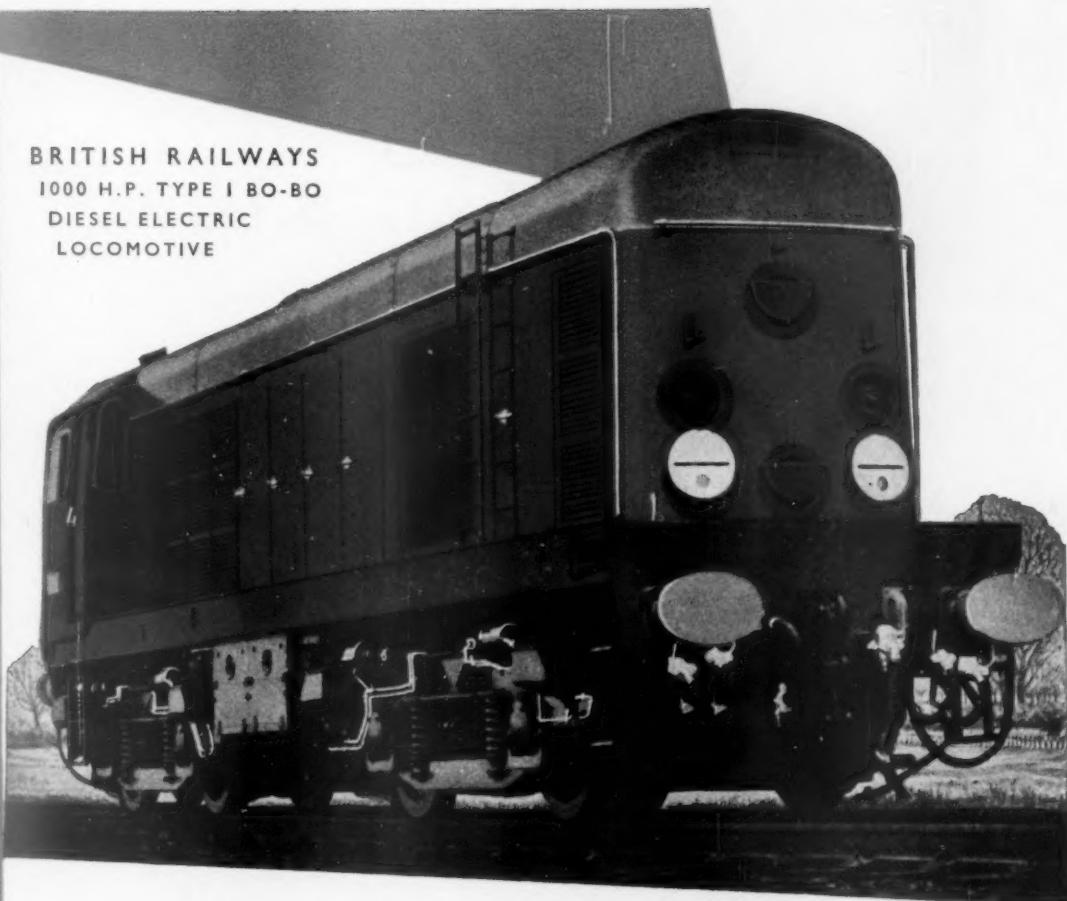
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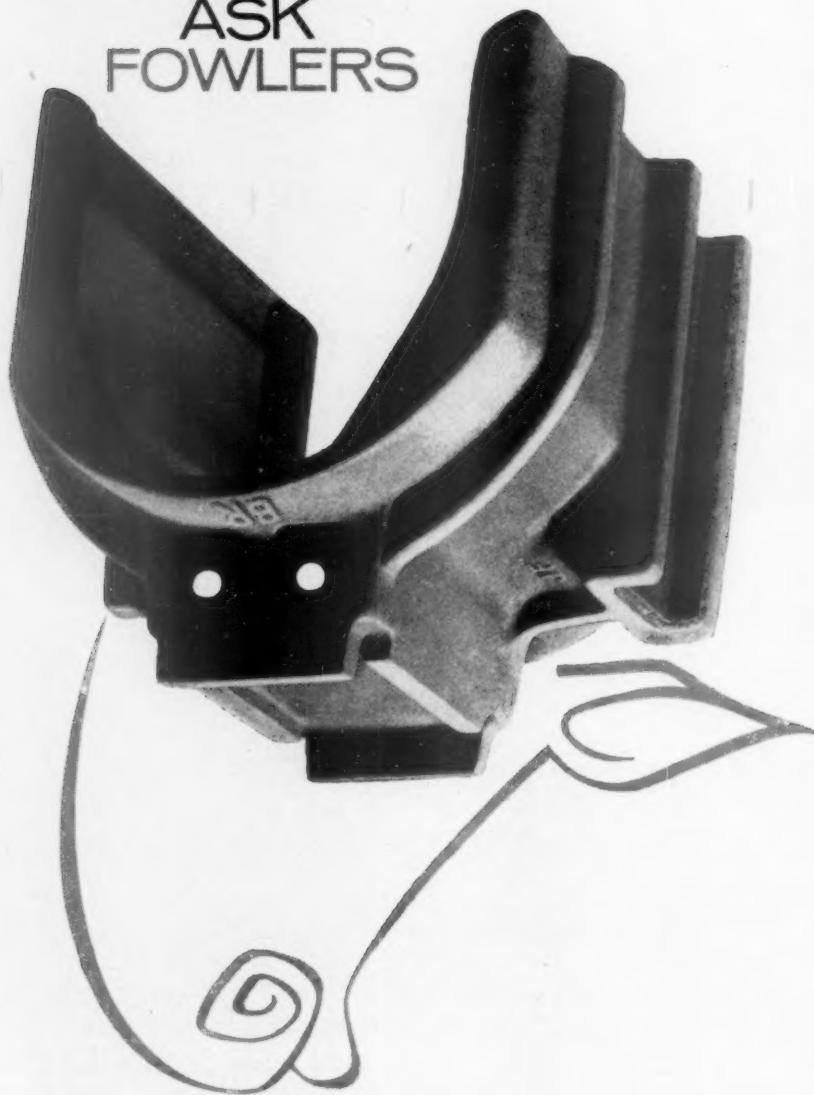
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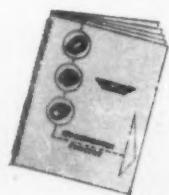
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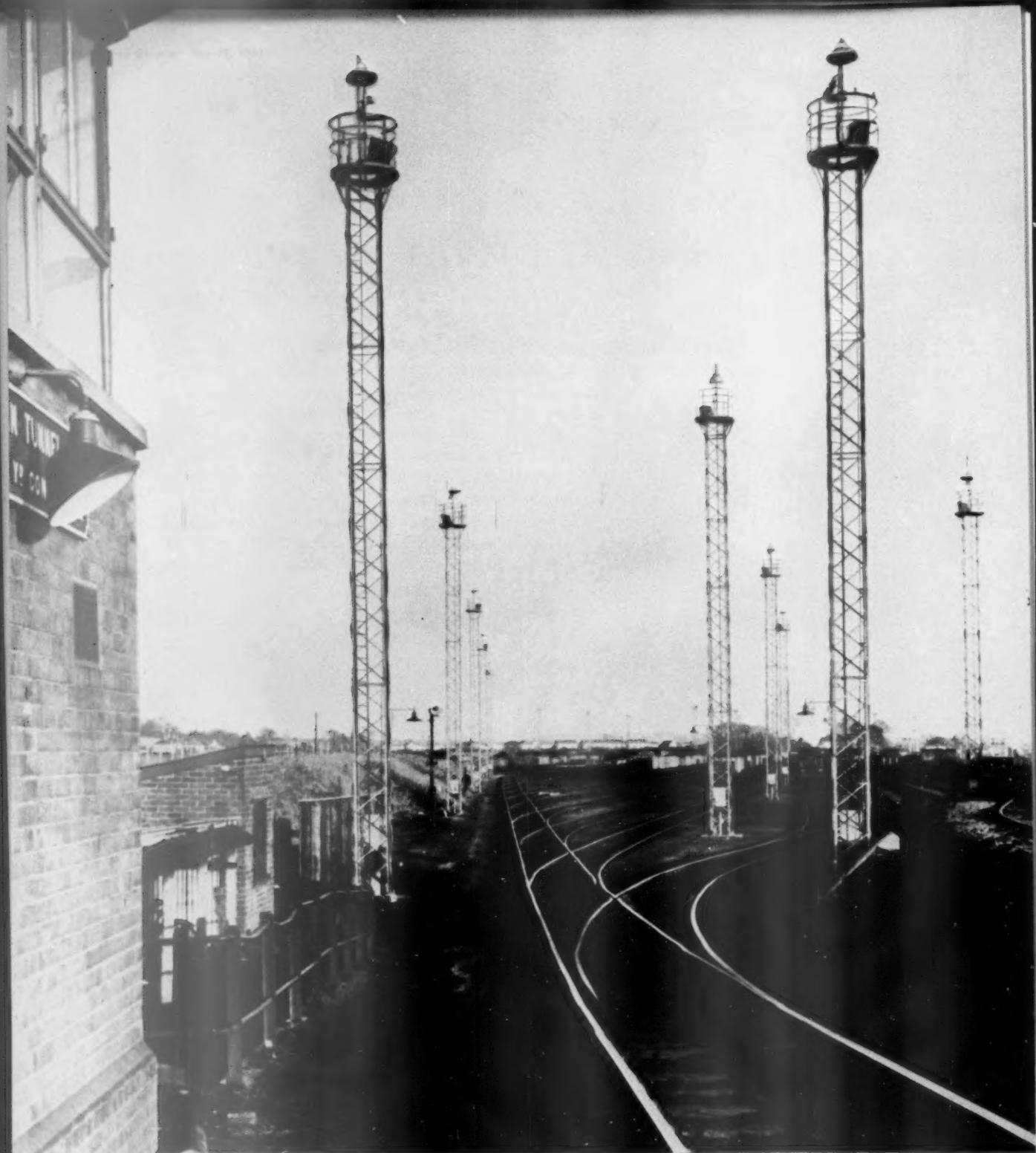
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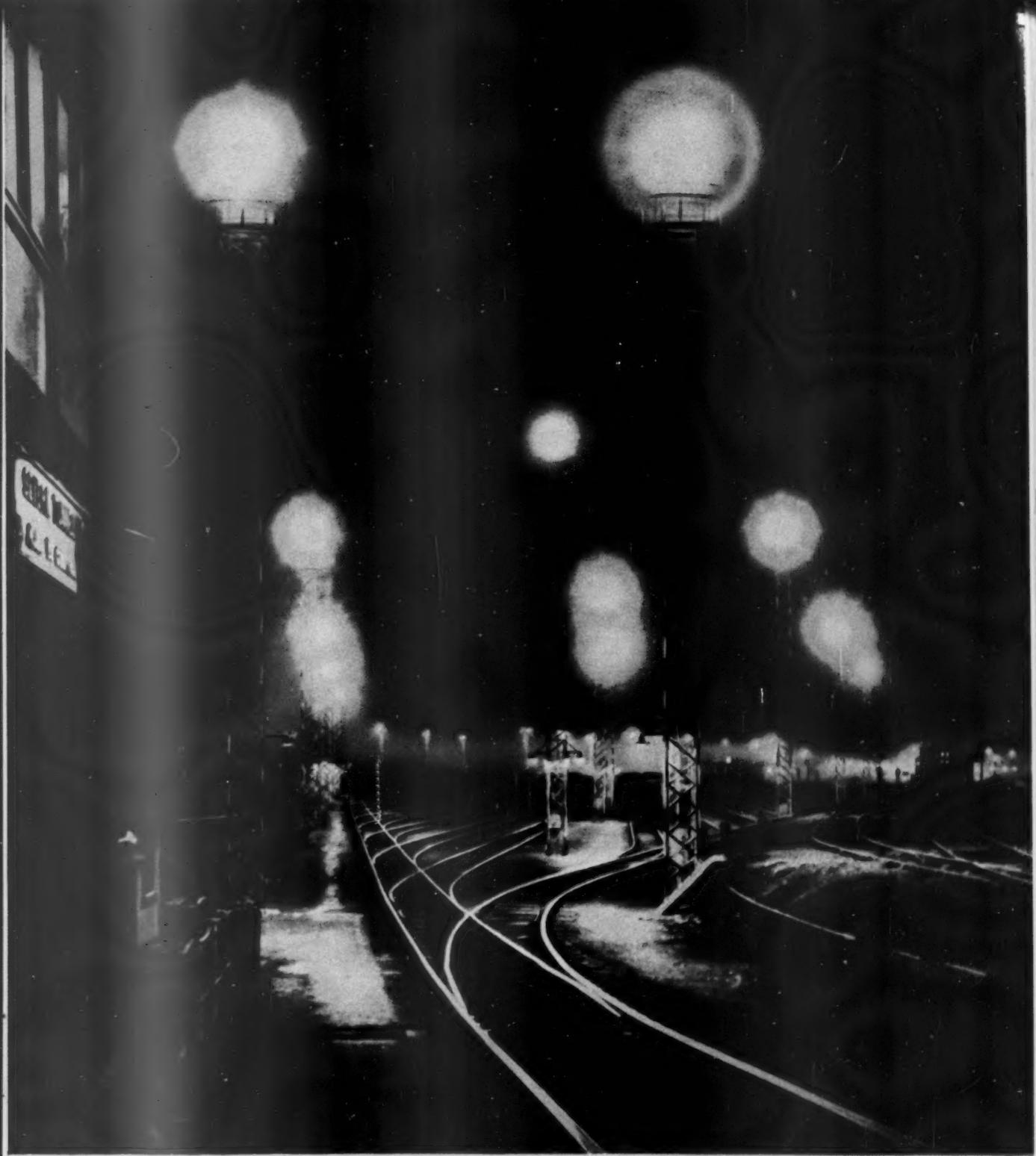
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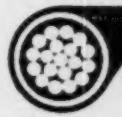
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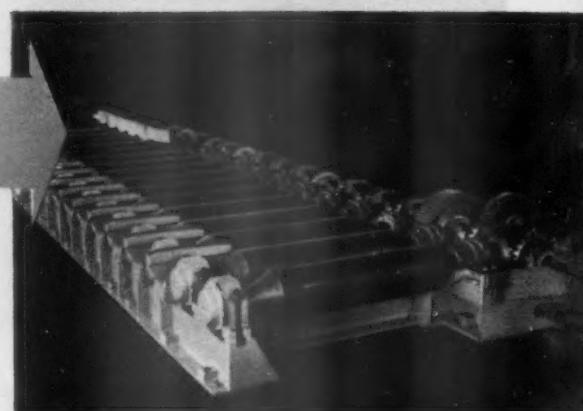


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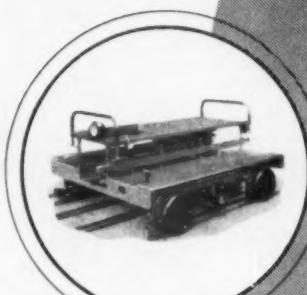
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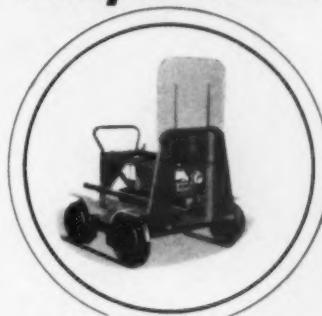
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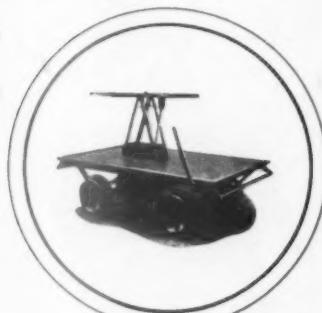
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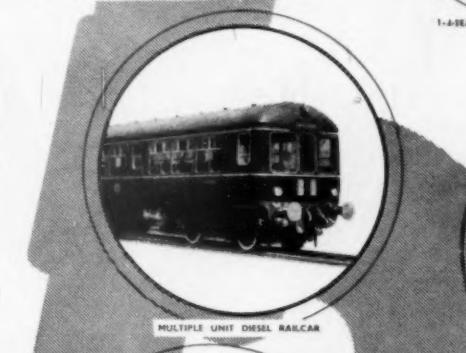
LIGHT 6-8 SEATER GANG TROLLEY



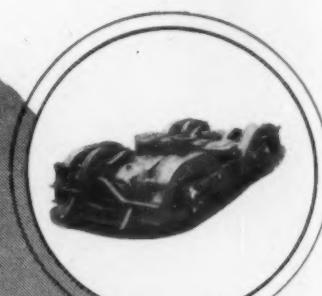
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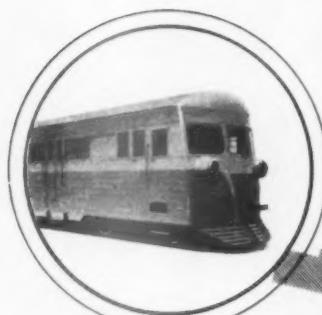
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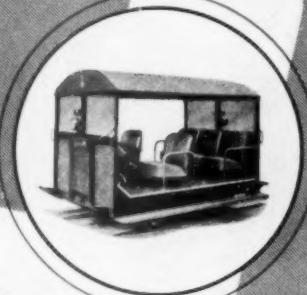
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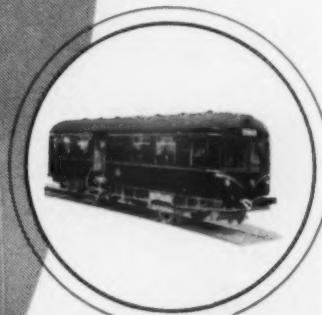
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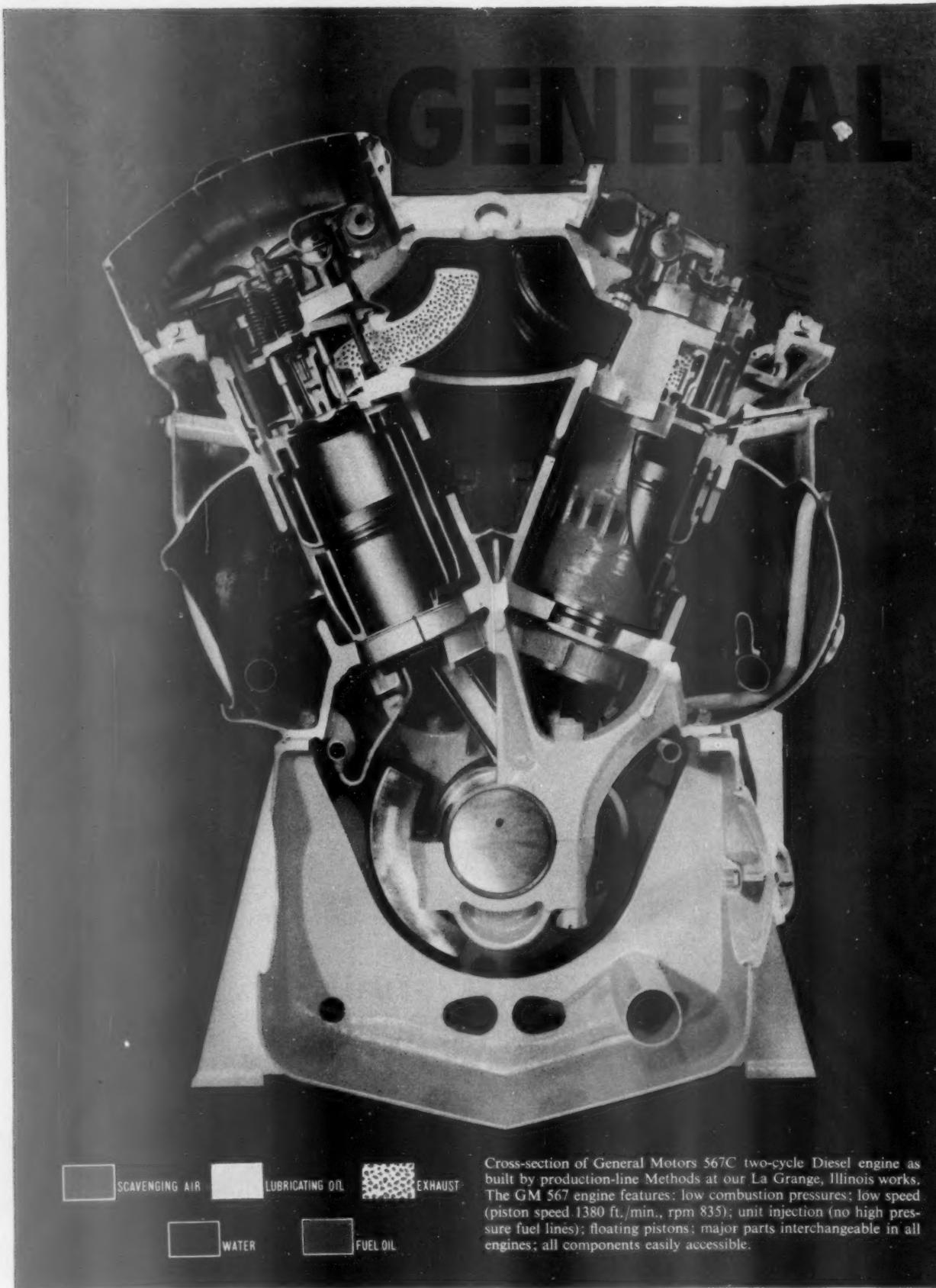
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A detailed cross-section photograph of a General Motors 567C two-cycle Diesel engine. The engine is shown from a front-three-quarter perspective, revealing its internal components. The cylinder block is at the bottom, with a flywheel and a gear assembly at the front. Above the cylinder block, the engine features a complex arrangement of valves, a camshaft, and a piston. The intake air is directed into the cylinder through a valve, and the exhaust is directed out through another valve. The engine is mounted on a sturdy base with several mounting bolts. The background is dark, making the metallic parts of the engine stand out.

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For example, a set of pistons for a GM 567 Diesel engine costs as much as 50 per cent *less* than pistons for another Diesel of comparable capacity—and GM 567 engine pistons frequently run more than 500,000 miles.

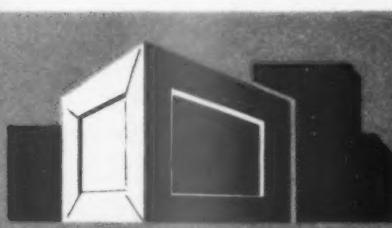
Moreover, GM locomotive parts are easily

accessible—require less time to replace. A complete cylinder assembly of a 567 engine can be replaced by two men in less than one hour.

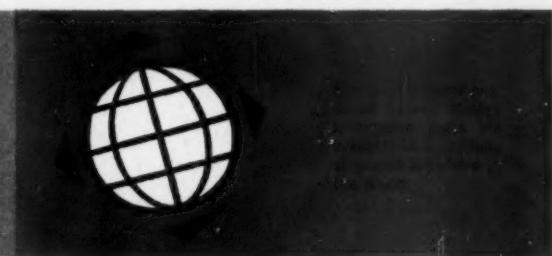
And because of high interchangeability, GM locomotives require the smallest parts inventory. The same piston fits all 567 engines from six to sixteen cylinders—and latest improvements in parts are made applicable to old units as well as new.

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The *real* price of a Diesel locomotive is determined by what it costs to operate and maintain across its years of useful life. Actual service records of railways the world over prove that General Motors locomotives *cost less in the long run*.



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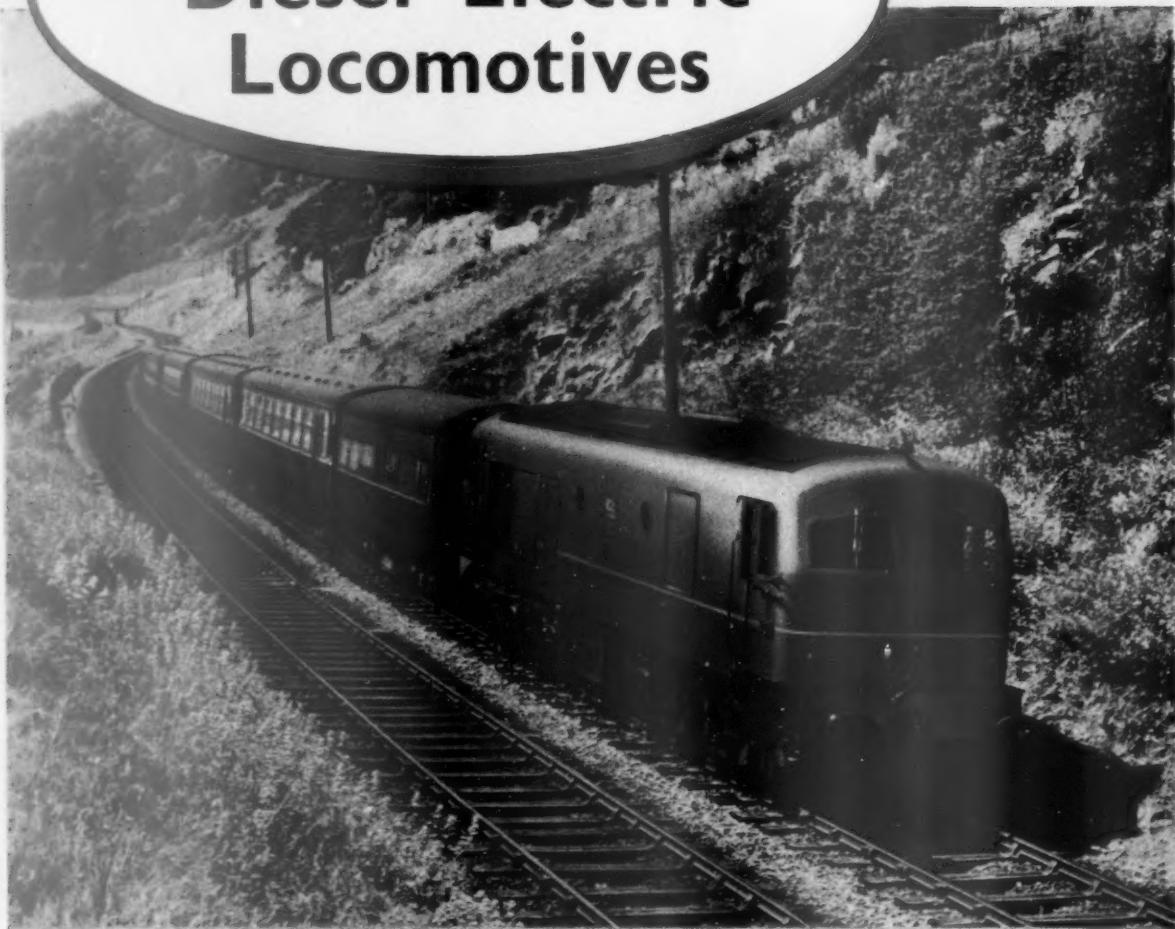
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A journal of Management, Engineering and Operation

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Learning from adversity

THE very successful golden jubilee celebrations of the Institution of Locomotive Engineers were marked by an excellent and very practical paper delivered by Sir Brian Robertson, Chairman of the British Transport Commission, in the form of the Sir Seymour Biscoe Tritton lecture. This was the subject of an editorial in our last week's issue, and since then it has been widely commented on in the electrical industry. Sir Brian Robertson emphasised that, as a result of the experience gained from recent troubles in the British electrification projects, our manufacturers had made discoveries which had been previously unknown. He emphasised that no trouble had developed on the new services which could be described as basic and which could not be overcome. Conditions on British Railways are well known to be more exacting than on any other railways in the world, and equipment which stands up to them have passed the sternest test to which they would be subjected elsewhere. In Scotland, where there has been some trouble with the electrification, the manufacturers have

been dealing with a system which is unique in that a high voltage has to be broken down by a quarter and this has imposed violent conditions on the equipment. The system has never been tried before and the troubles arose not during testing, but when the whole system was in operation. The lessons learned from this experience will enable British manufacturers to meet similar demands anywhere else in the world. A great deal of experience has been gained which other countries have not had. As overseas territories develop they will find need for local services within a large system and may well use the principles which have been adopted in Scotland. It is clear that British engineers will be in an outstanding position to meet demands of this kind. A very great deal of research has gone into the investigation of the troubles which have arisen on British Railways, and as a result there is good reason for believing that the equipment now available is the best that there is. It may well be, therefore, that the adversity which at one time appeared to be afflicting British Railways in its electrification project may prove ultimately to be of great value to the nation in the experience it has given home manufacturers of the most modern form of electric traction equipment.

Mr. Chalk wants to buy

REFRESHINGLY well-informed on railway matters, Mr. G. W. W. Chalk, Queensland Minister of Transport, is over here on a fortnight's visit to study British Railways and to talk with the Ministry of Transport and representatives of the British railway equipment industry. Queensland is facing something of a railway crisis—having inherited a deficit-producing state-controlled railway system while itself believing in private enterprise, it is determined to profit economically from its responsibility. Accordingly, it has engaged the American firm of engineering consultants, Messrs. Ford, Bacon, & Davies, to make a report on its railway system at a cost of £100,000. The choice of an American firm was made because it was hoped to gain finance for railway improvement from the World Bank, and it seemed logical to employ consultants of the same nationality as that which formed the mainspring of the concern which might supply that finance. The railway crisis faced by Queensland concerns the improvement of the Mount Isa lines—a project of importance not only to Queensland but to the whole Australian continent, because the mines have promised to increase production from 4,000 to 19,000 tons per day.

Steam, diesel—or hovercraft?

FROM the point of view of maintenance and operation, Queensland realises that it is necessary to concentrate either on steam or diesel traction—further electrification is not under consideration because of the relative sparsity of population. The question is: whether to concentrate solely on dieselisation, or whether to keep to steam—Queensland Railways already has a number of Beyer-Garratts which has given excellent service. Queensland transport might be augmented by hovercraft—Mr. Chalk will see what these can do in the Isle of Wight. He wants to improve his State's transport facilities: he does not mind by what means this aim is achieved. If, as

claimed, hovercraft can move two wagon-loads—40 head of bullocks—safely and quickly over Queensland terrain, hovercraft may solve Queensland's transport problem. This does not mean that all Queensland's railways will be uprooted in favour of hovercraft: but it might mean that hovercraft will be used to supplement railway facilities. On the other hand, if Mr. Chalk can be persuaded that steam or diesel traction would better answer his Government's problem, he might recommend the purchase of other forms of traction.

An open mind

MR. CHALK is accompanied by Mr. A. Lee, Assistant Secretary of the Queensland Railway Department, and Mr. J. Goldston, Locomotive Engineer. He has already spent a month in the U.S.A., studying American railway operation in general and diesel working in particular. Now he wants to observe British railway working, with particular reference to comparative performances obtained with steam and diesel traction. The considerable benefits obtained from work already carried out on the Mt. Isa project has inclined the Queensland Government to favour a complete rehabilitation of the Queensland Railways, and it is anxious to consider the project in the light of experience obtained both in the States and in Britain. He is in favour of dieselisation, but is prepared to listen to builders of steam locomotives if steam traction can meet the requirements of his State. After his opinions have been formed, he will assimilate the report of the American consultants and report his conclusions to his Government.

Hymek handing-over

THE first of 95 1,700-h.p. Type 3 diesel-hydraulic locomotives to be built by Beyer Peacock (Hymek) Limited for the Western Region of British Railways was handed over on May 16 by the builders' Chairman, Mr. H. Wilmot, at a ceremony in Paddington. Among those present were Mr. K. W. C. Grand, Member B.T.C., Mr. R. F. Hanks, Chairman, Western Area Board, Mr. J. R. Hammond, General Manager Western Region, and Mr. R. A. Smeddle, Chief Mechanical & Electrical Engineer, Western Region. The first of these locomotives, Mr. Wilmot said, was scheduled for delivery at the end of July. He paid a tribute to the B.T.C., Mr. Smeddle, Swindon, and the builders' associates and sub-contractors for the assistance which had rendered completion possible at such an early date. Mr. Hanks accepted the locomotive and said that this type would replace the "Halls" and "Granges," and ultimately would be used throughout the Western Region. The design and construction have been to the general requirements of the B.T.C., under the overall direction of Mr. J. F. Harrison, Chief Mechanical Engineer, B.R. Central Staff.

Locomotive Golden Jubilee luncheon

THE Golden Jubilee luncheon of the Institution of Locomotive Engineers held at the Dorchester on May 10 was attended by 740 members and guests. It was remarkable for an important statement by the Minister of Transport, which is dealt with at greater length elsewhere in this section. Mr. D. C. Brown, the President, justly took pride in the great growth which has taken place in the Institution since it was founded at a meeting of eight men in February, 1911; two of these—Mr. J. Pelham Maitland and Mr. E. W. Taylerson—were present at the luncheon. During his jubilee year of office, the President had visited all the centres, with the sole exception of Bulawayo, and there Mr. E. S. Cox, past President, had delivered an extremely interesting paper. This country was the father of the locomotive, and the Institution was indebted to British Railways for many of its presidents and members, as well as for valued contributions to its proceedings. It was also very much indebted to the B.T.C. for the help it had given in providing the exhibition of rolling stock to mark the jubilee.

Tributes to Sir Brian Robertson

BOTH the Minister of Transport and the President of the Institution of Locomotive Engineers paid warm tributes to Sir Brian Robertson, Chairman of the British Transport Commission, who will be vacating his office at the end of this month. Mr. Ernest Marples referred to the great efforts Sir Brian Robertson had made during the last eight years, which had been a period of grinding and arduous work, and which had been marked by little gratitude from the public. Mr. D. C. Brown announced that the Council had unanimously decided on the unusual course of nominating Sir Brian Robertson for honorary membership of the Institution. Sir Brian Robertson himself said that in leaving the B.T.C. he called to mind the statement he had made to Lord Montgomery when he had left his staff and which he felt to be just as apposite at the present time—"I have never had a dull moment with you, although I have had many anxious ones."

McFadzean Laboratory

THE new McFadzean laboratory, at the Wood Lane research centre of British Insulated Callender's Cables Limited, was officially opened by H.R.H. The Duke of Edinburgh, on May 16. This six-storey building, providing 64,000 sq. ft. of floor space, was erected at a cost of approximately £500,000. It houses many departments of the Group's research organisation, the purpose of which is to carry out such long-range experimental work as is required to give to the engineering laboratories information needed to fulfil their shorter-range objectives. It also conducts basic research in fields of lasting interest, whether or not this has any immediate applicability. Additionally the organisation provides centralised facilities where the spreading of these over separate factories would be uneconomic or inefficient. The complete facilities now available are convincing proof of the great importance which is attached by B.I.C.C. to research.

Commonwealth training week

NEXT Monday week, May 29, sees the commencement of the Commonwealth Technical Training Week, a project aimed at making the Commonwealth aware of its responsibility toward the young person trying to find a niche in life. Each of the 37 countries taking part is responsible for its own arrangements—in some hot climates the week will be held earlier than the generally-accepted period of May 29—June 4. In Britain, Prince Philip, who has initiated the scheme, has asked the City & Guilds of London Institute (of which body he is President) to be an over-seeing, co-ordinating body. Detailed U.K. organisation is in the hands of local authorities: actual arrangements in general are being made by youth employment committees or technical colleges.

Minister's view of railway problem

WHEN the Minister of Transport addressed the members and guests at the Golden Jubilee luncheon of the Institution of Locomotive Engineers he said that he wished to make a serious assessment of the railway problem as he saw it. Mr. Marples explained that because of the importance he attached to his statement he intended to read it. This was an unusual procedure for Mr. Marples, who is an excellent and fluent speaker, but who on occasions of this kind has been inclined often to be rather light-hearted in his remarks. It was clear that he was taking the occasion to expound a point of view suitable for a wider audience than that gathered at the luncheon, and he insisted that the points he was making were based on discussion, enquiry, research, and thought.

The Minister denied emphatically that he was anti-railway. He said that he was pro-railway. He was also pro-transport and pro-taxpayer. Nobody wished to see railways disappear, for they were a national possession of the greatest value. In this highly industrialised country it was impossible to be efficient

unless there was an efficient distribution link between production and consumption. That was why the Government had made it clear that it saw a continuing future for a railway system. He insisted that that system must be efficient; must be used in the national interest; and must be used to best advantage.

To be sure that the railways played their proper part, it was necessary to ensure that the right amount of capital investment was directed to the right things. Money that was used to modernise railways or to build roads could not be used elsewhere, and transport took a large slice of the country's resources in manpower and materials. Steps were being taken to look at public investment in transport as a whole. Whether it was right to use a particular part of the nation's resources in a particular way must depend largely on whether the results would be remunerative.

At the moment the railways were not paying their way. They were subsidised to the extent of 4d. in the £ on the standard rate of income tax. They received an annual subsidy of over £100 million. The British Transport Commission had informed the Minister of what it would like to do to modernise railways over the next four years, but these proposals were costly. The Government had to consider how far it could agree to them—perhaps at the expense of some other form of public investment.

Having produced the right amount of money and used it in the best ways, it was necessary to see that the railways were free to use their assets without being fettered by obsolete restrictions. In the White Paper on the reorganisation of the nationalised transport undertakings, the Government had announced its intention to remove the main restrictions under which the railways hitherto had suffered. The Government would do this, said the Minister, but the railways themselves must also help. They had to concentrate on getting, holding, and increasing their carriage of the right traffics. Those traffics must be the ones that would pay off.

It would also be necessary to have a high technical performance. Equipment and performance must be of the highest order if the vast capital investment in the railways was to be justified. In this connection research and development could help. The Minister said that he had recently informed Sir Brian Robertson of his agreement to the construction of a new engineering research laboratory for the railways, and he, and the Commission, were discussing plans for enlarging and improving the Commission's organisation for research and development and for increasing scientific staff. The aim was to get the best scientific and technical advice for railways and an even closer relationship with the research organisations of private industries.

It was also necessary to arrive at a railway system of the right size and shape. He recognised the difficulty of this problem, but claimed that progress was being made. Success would not be achieved unless railway management and railway employees played their part. Management had to be sensitive to the need for carrying the right traffics at the right price. Labour could make a massive contribution by increasing productivity.

Mr. Marples admitted freely that the White Paper proposals were only a skeleton, and he did not underrate the immense difficulties of framing the new legislation, but he was confident that in the end there would emerge a railway undertaking superior to anything that this country had had so far. For the first time, the board running the railways would have no other responsibilities to distract it.

It was an unpalatable fact of life that reorganisation might mean some inconvenience or even hardship. There was no alternative, because it was impossible to continue in a situation where the railways were increasingly propped up by the taxpayer.

Mr. Marples ended by summarising his points, as follows:—the Government wants to see a railway system of the right size and shape; it wants to see it modernised and efficient; it wants to see it free from obsolete restrictions; it wants it to have a

high technical performance; it wants it to be viable, so that management and men could be proud to work in railways. To this end, he concluded, the Government had already produced £600 million for modernising and there was more to follow—always provided that it could be justified.

Diesel and electric traction

ARRANGEMENTS were made by U.K.R.A.S. for Mr. E. S. Cox, Assistant Chief Mechanical Engineer, British Railways, to visit South Africa at the time of the Rand Show, and deliver a paper on "British Railways' Experience with Diesel & Electric Traction." This paper was read, under the patronage of the South African Railways, at Witwatersrand University, Johannesburg, to an audience largely from the S.A.R. It was also repeated to railway audiences at Bulawayo and Nairobi.

As would be anticipated, the paper was appreciatively received, for nowhere outside Britain is large-scale experience available of the operation, under comparable conditions, of diesel locomotives with hydraulic and electric transmission. The intensive traffic conditions encountered in Britain also enable much experience to be accumulated in a relatively short time. Accordingly the subject is of great interest to a far larger number of people than those who were privileged to be present.

Mr. Cox prefaced his paper by explaining the extent of British Railways diesel power. At the beginning of this year there were 2,550 such locomotives and 2,290 diesel motor-car units at work. On order are 1,246 locomotives and 175 more motor cars.

Where diesel engines are concerned, compared to the virtue of reliability all other factors are of relatively minor importance. Reliability comes from an engine which has been sufficiently long developed in traction work to have survived, or been modified to meet, the utmost which railway service can demand by way of arduous piston temperature conditions, bearing performance, and resistance to the effects of vibration of all kinds. Such reliability is found in both high-speed and medium-speed engines, heavy or light, vee or single- or double-bank, the common factor being solely that of full development.

Both high- and medium-speed engines are represented in B.R. continuing choice, and up to now, no real trend of preference has emerged between them. Particulars were given of mileages between overhauls and it was stated that the engine power ranges originally selected are proving generally well related to traffic needs.

All over the world engineers are seeking operating experience with different forms of transmission to give a lead to their own policy. In British experience, so far as main-line locomotives are concerned, nothing has as yet been distinguished to show superior merit for either electric or hydraulic transmission. Both do a first-class job in performance and reliability, and neither is pre-eminent in assuring a lower first cost for the whole locomotive.

Apart from main-line locomotives, power cars for multiple-unit diesel trains include examples of mechanical, hydraulic and electric transmissions, the former in the large majority. The combination of fluid flywheel and Wilson four-speed epicyclic gearbox has, Mr. Cox pointed out, proved very suitable in unit powers up to 250 h.p. Being derived from road transport, it has required gradual strengthening up in certain components, for rail-traction conditions, as has the final axle drive, including the mechanical reverse.

Electric drive, in this context, has called for less development with its attendant teething troubles, but in this class of work advantage has been somewhat counter-balanced by higher weight and first cost.

Mechanically, neither underframe and chassis nor bogies give any trouble, and they together account for less than 1 per cent of the casualties. More serious is collision damage due to carelessness in shunting and moving about the

depots, and this is proving a rather intractable problem. Because of the many old bridges which exist with short-span girders, wheel spacing is important, and less than 7 ft. 3 in. spacing on a six-wheeled bogie, or 8 ft. 6 in. on four-wheeled bogies, has generally to be avoided. Laterally there is no evidence that diesels are punishing to the track, and flange forces were stated to be quite moderate. Civil engineers are taking a great deal of interest in the vertical effect, particularly upon rail joints, of heavily-loaded leading axles on the one hand, and of nose-suspended traction motors on the other. Much research work is being undertaken and some of the trends which have emerged were described.

Speaking on future development Mr. Cox said that existing Type "4" locomotives of 2,000 h.p. provide no margin over the largest steam locomotives and some increase in power is desirable. On the other hand the Type "5" 3,300 h.p. locomotives have more power than can be used on the generality of services, and are correspondingly expensive. Calculations have indicated 2,700 h.p. as being able to meet all foreseeable power requirements over the majority of routes.

So far as Britain is concerned 40 years has been agreed as the life of a diesel locomotive and 20 years as the engine life.

The remaining part of the paper covered experience with rolling stock on the 25 kV. 50-cycle system. Considering the magnitude of the design and development undertaking, the situation was reported to be on the whole a creditable one.

British Railways decided to pursue both diesel and electric traction on a large scale simultaneously, and the situation at the beginning of this year was that diesel traction accounted for 28.5 per cent of all engine miles, and electric traction for 12.4 per cent. While electrification is the superior goal, capital investment in practice limits both the pace of its installation and its ultimate extent. The economic state of British Railways would not permit general continuance of steam for the many years which must elapse before all trunk routes are electrified, and diesel traction is giving immediate relief by widespread and quickly realisable reductions in running costs.

Railway superannuitants

MANY railway superannuitants are existing close to the brink of penury in spite of the increase, in 1956, to those who retired before 1951. A large number have no other source of income beyond their annuities because, being in what was then known as "exempted employment," they did not come within the scope of the national insurance or the old age pension schemes as they were then constituted.

The supplementation of some annuities out of Treasury funds recently authorised by the Prime Minister, in his capacity as First Lord of the Treasury, may well help to alleviate the plight in which some retired servants of the former railway companies find themselves but it does not go far enough. The British Transport Commission scheme of supplementation

gives nothing to aged ex-employees of the former London Midland & Scottish Railway who retired after 1953 and nothing to ex-employees of the other former Railway Companies who retired after 1956. Some of these are no doubt receiving benefits from the existing National Insurance scheme but they cannot be full benefits in many cases.

The table below illustrates the difference between supplementary pensions granted by the British Transport Commission and those granted under the various Pensions (Increase) Acts; the disparity serves to demonstrate the necessity for speedy and effective action. This is a point which might well be borne in mind in framing the proposed legislation for the railways.

Swindon-built dynamometer cars

IN the superseding of steam traction by diesel- and electric-powered locomotives to meet the requirements of the modernisation plan for British Railways, many new designs have been introduced. A proportion of the teething troubles associated with the new equipment have inevitably arisen from the difficulties encountered in simulating track conditions on the test bed and in the investigation of transient effects under running conditions. These factors have had a very direct influence on the design of the new dynamometer car produced at Swindon by the Western Region of British Railways.

Two other factors of major importance which have been considered were the availability of British-made fully-developed electrical and electronic measuring equipment and the requirement for test equipment suitable for use with the Controlled Road Testing System. The technique of strain-gauge testing and load measurement has become well established in industrial fields and, when combined with potentiometric recorders, the system is ideally suited for the dynamometer car application. It has also made possible the use of a standard vehicle underframe, thus saving the expense of the special vehicle necessary for the installation of hydraulic dynamometer equipment. The lightweight transistorised electronic instruments and the potentiometric recorders are assembled as self-contained individual units. This facilitates servicing and provides a high degree of flexibility in the selection of an instrument range to suit the application.

Recordings with this equipment are obtained by injecting the voltage output from the measuring element into a bridge circuit which is energised with reference to a standard voltage. Any unbalance between the voltage of the measuring element and the potentiometer in the bridge circuit creates an unbalance in the bridge. This is amplified to a power level sufficient to operate a balancing motor to adjust the potentiometer. This movement also imparts a displacement to the recorder pen proportional to the value of the variable being measured. The balancing action starts with the slightest change in the output voltage of the measuring element; thus recording and

B.T.C. 1961 SCHEME OF SUPPLEMENTATION—COMPARED WITH PENSIONS (INCREASE) ACTS
L.M.S.R. STAFF ONLY. (1953 and later—no increase)

| Date Retired | Basic £130 | Basic £150 | Basic £200 | Basic £250 | Basic £300 | Basic £400 |
|----------------------------------|------------|------------|------------|------------|------------|------------|
| 1-7-46 to 31-12-46 L.M.S.R. Acts | 188 + 44.6 | 208 + 38.6 | 258 + 29.0 | 280 + 12.0 | 330 + 10.0 | 432 + 8.0 |
| 1951-52 L.M.S.R. Acts | 234 + 80.0 | 264 + 76.0 | 342 + 71.0 | 404 + 61.6 | 466 + 55.3 | 589 + 47.3 |
| 1953-54 L.M.S.R. Acts | 147 + 13.1 | 167 + 11.3 | 217 + 8.5 | 260 + 4.0 | 310 + 3.3 | 410 + 2.5 |
| | 171 + 31.5 | 196 + 30.6 | 251 + 25.5 | 319 + 27.6 | 381 + 27.0 | 504 + 26.0 |
| | 130 + Nil | 150 + Nil | 200 + Nil | 250 + Nil | 300 + Nil | 400 + Nil |
| | 145 + 1.5 | 175 + 16.6 | 224 + 12.0 | 280 + 12.0 | 336 + 12.0 | 448 + 12.0 |

OTHER THAN L.M.S. (1956 and later—no increase)

| Date Retired | Basic £130 | Basic £150 | Basic £200 | Basic £250 | Basic £300 | Basic £400 |
|--|-------------|------------|------------|------------|------------|------------|
| 1-7-46 to 31-12-47 L.N.E.R. Before 1-4-47 Acts | 193 + 48.4 | 213 + 42.0 | 263 + 31.5 | 285 + 14.0 | 335 + 11.6 | 440 + 10.0 |
| | 234 + 80.0 | 264 + 76.0 | 342 + 71.0 | 404 + 61.6 | 466 + 55.3 | 589 + 47.2 |
| 1950-51 L.N.E.R. Acts | 183 + 40.6 | 203 + 35.3 | 253 + 26.5 | 275 + 10.0 | 325 + 8.3 | 425 + 6.2 |
| | 171 + 31.5 | 196 + 30.6 | 251 + 25.5 | 319 + 27.6 | 381 + 27.0 | 504 + 26.0 |
| 1954-55 L.N.E.R. Acts | 147 + 13.07 | 167 + 11.3 | 217 + 8.5 | 260 + 4.0 | 310 + 3.3 | 410 + 2.5 |
| | 145 + 11.5 | 175 + 16.6 | 224 + 12.0 | 280 + 12.0 | 336 + 12.0 | 448 + 12.0 |

+ Shows percentage increases.

Note: The above figures give some indication of the differences as between the B.T.C. Supplements and the Supplements provided by the Pensions (Increase) Acts

indicating are practically instantaneous with the change.

In the layout of the main recording equipment the control console has been arranged for full instrument visibility from an adjacent conference room. This permits a close control of test procedure and discussion of recordings as the test proceeds. Certain of the major readings are also shown on a panel at the back of the console, facing the dynamometer room. In this section of the car, benches are provided for the accommodation of portable laboratory instruments. These instruments, drawn as required from a headquarters pool, will be used to investigate special problems not directly associated with performance characteristics.

Instruments available for this work include a 36-channel ultra-violet galvanometer recorder with a recording speed range of 120 to .05 in. per sec., an oscilloscope particularly suited to the ride frequency range of railway vehicles, and several six-channel portable recorders. For use with the above there is a collection of strain, temperature, displacement, acceleration, pressure, vacuum and speed transducers, which enable these quantities to be converted into electrical quantities. There is also a vehicle oscillation recorder. So that the ac-

curacy of this laboratory-standard equipment can be matched, close regulation of frequency and voltage is required in the power supplies. This requirement has been met with the Macfarlane Transicon alternator, the fine adjustment controls for frequency and voltage being mounted on the console panel.

Although this equipment will be used primarily for the investigation of problems under running conditions, it will also be available for trackside use if required. The traction recordings obtained are arranged to suit the controlled road testing system. This unique method of testing, which was evolved by the Research & Development (Rolling-Stock) Department of Swindon Works, produces all the usual traction and resistance characteristics from trains operating normally, the required control being inherent in the system. Previously, all traction characteristics were obtained by a series of tests at various fixed speeds and rates of working, the speed being held constant by braking. In the new system, control is exercised over the rate at which fuel is used by the power unit. The results obtained by this system are readily convertible to the form required by the traffic staff when compiling route schedules.

LETTERS TO THE EDITOR

THE EDITOR IS NOT RESPONSIBLE FOR THE OPINIONS OF CORRESPONDENTS

FRENCH SUMMER TRAIN SERVICES

May 1

SIR, In the interests of accuracy you will, I am sure, allow me to correct a statement under "French summer train services" on page 468 of your issue of April 28. This statement says that "L'Aquilon" at present leaves Lyon at 8.5 a.m. and that next winter the train will leave at 7.25 p.m., as a relief to the northbound "Mistral."

In fact, until the summer of 1960, "L'Aquilon" used to leave Lyon at 8.5 a.m. (thereby affording during summer a throughout day service from Lyon to London) but, since the autumn of 1960, has been running in the 7.25 p.m. timing from Lyon, to relieve the "Mistral," and presumably because the patronage of the morning timing was not very good.

Yours faithfully,

T. V. NICHOLSON

8, Amersham Road,
High Wycombe, Bucks

FUTURE POLICY FOR BRITISH RAILWAYS PASSENGER SERVICES

April 28

SIR, I would like to comment on two letters printed in your issue of April 14: the first, headed "Winning back railway passengers," by Mr. D. W. Mountain, and the second, "Transport users' consultative committees," by Mr. C. R. Clinker. The former expresses the view that there should be practically no further closures of lines, and the latter advocates further substantial withdrawal of services.

With regard to Mr. Clinker's arguments, I sympathise with the fact that railway managements must often find the Transport Users' Consultative Committee procedure slow and exasperating. Nevertheless, there is widespread concern among the public and many railwaymen that these committees have often accepted proposals for withdrawal of services which could have been continued while making some contribution toward the general overheads of operating a line which, in any case, had to be retained for goods traffic.

Mr. Clinker also criticises amateur busybodies seeking to prove that the costs of operation provided by railway authorities to support a case have often been distorted. Nevertheless, such instances of inaccuracy in the railways' figures have been discovered on a number of occasions and the scathing

criticisms of railway accounting made by one of the Government advisory committees on British Railways support the view that, since nationalisation, the management of British Railways has had no accurate view of the profitability or otherwise of individual railway services, and few figures from which to produce accurate estimates of savings which might be made by the withdrawal of trains, or of the additional costs incurred elsewhere as a direct result of withdrawals.

With regard to Mr. Mountain's letter on winning back passengers, I would like to give my support to his sensible analysis of the problem and to the possibilities of winning back appreciable passenger traffic from motorists worried by overcrowded roads who are undoubtedly attracted by semi-fast cross-country-type services similar to those provided by the "Trans-Pennine" diesel trains. Many sections of British Railways management seem to be unduly obsessed with existing large-scale modernisation plans primarily directed to providing services between the larger cities at high average speeds of 70 m.p.h. or more and with few intermediate stops. For certain long-distance routes, some trains of this nature are undoubtedly likely to be highly profitable, but there is one great difficulty (particularly for distances of under 200 miles) which has not yet been properly appreciated. This difficulty is similar to the complaints regarding the air lines: that it is not much use flying from an airport in the vicinity of Paris to London Airport in 45 min. if a further 1½ hr. must be spent in passing through customs and travelling to the centre of London.

London and many other large cities have now grown to such a size that the railways are already suffering in the same way. Thus, it is not much use providing a non-stop train from St. Pancras to Nottingham at an average speed of 80 m.p.h. if a passenger has to travel from his home on the borders of Hertfordshire or Bucks, by suburban train or car in the wrong direction to St. Pancras—a journey for which he must allow something like 1½ hr., including allowance for delays and finding a seat. On top of this he may have to wait on completion of his business for a further 1-1½ hr. before he can catch a similar fast train back. Such a passenger is very likely to undertake his journey by car along one of the new motorways at an average speed for his whole journey of, say, 50 m.p.h.

If this passenger's custom is to be retained or regained by British Railways the only way it can be done is not by non-stop trains at 70 or 80 m.p.h., but by hourly services of semi-

fast express trains, such as might be provided by an interval service from Marylebone calling at Aylesbury, Woodford, Leicester, Nottingham, Sheffield, and so on, with a proper interlocking service of stopping trains where the density of population is sufficient for them to cover operating costs. In other words, the size of the big cities has already reached the point at which such a passenger would find it quicker to travel on an all-stations stopping train from, say, Rickmansworth to Aylesbury and, after a 10-min. wait, pick up a semi-fast express to the north, than he would to travel by suburban train or car to St. Pancras to catch a non-stop train to his destination. Only for distances over about 200 miles would this cease to be true.

This argument is not intended to claim that a number of non-stop business services should not be provided from main-line London termini, but to point out that such trains provide only a very small part of the service which is needed to retain passenger traffic and have a good chance of winning back passengers from the roads who are much more likely to be attracted by good and regular interval semi-fast services than by non-stop expresses between selected large cities. In other words, the main attraction to passengers is not only the speed of rail travel, but an hourly frequency of service morning and evening (with a two-hourly interval service mid-day often being acceptable), with reasonable speed, and a high degree of comfort and smooth running sufficient to write letters and reports, and adequate meal service, even if this has to be of the self-service variety.

The introduction of the "Trans-Pennine" trains and certain other services has already provided a considerable degree of proof that these contentions are correct, while the Southern has operated similar services for years with conspicuous success.

It may be helpful to consider a few further examples.

First, why did the Transport Users' Consultative Committees permit British Railways to withdraw through express services from Marylebone to Yorkshire on January 4, 1960, when British Railways now admits that these services were not withdrawn because they were not covering their operating costs, but that . . . "the proposals for the curtailment of passenger train services over the Great Central line were not founded upon premise that the services to be withdrawn were unremunerative in themselves, but that there was justification for economies to be secured from such withdrawals in the light of the full range of passenger travel facilities provided by the Commission within the territory served." In other words, this route is an obvious example of one which should be developed on the lines suggested by Mr. Mountain particularly, as such trains could have through portions or good connections at Woodford for Oxford, Reading, and the south and west, and at Sheffield for Huddersfield and Bradford; for Lincolnshire, and for Manchester.

British Railways states that it is not prepared "to support a policy of duplication of service between Sheffield, Nottingham, Leicester, and London, which would transfer substantial revenues from existing trains with services running at added cost." There is little doubt that some of the passengers using such trains would be transferred from other routes, but the proportion of the total would be likely to be very small, the majority of the traffic being new passengers won back from the roads, because such a service is complementary to the Midland Pullman and other crack trains on other routes.

On the other hand, while British Railways shows such lack of enterprise in this particular instance, one can look at the new services provided on the Cambridge line, where at Ely a two-hourly interval service of stopping trains is provided to connect with expresses to and from Cambridge and London. Connecting trains are provided by this means for Mildenhall, Norwich, Peterborough, Wisbech, March, and Newmarket. A glance at a map showing the density of population will show that many of these places are not large and that the population of the country districts served is relatively thin,

yet there is little doubt that the Eastern Region is correct in thinking that it is worth while providing these trains, whereas at the opposite extreme is the existing service on the Great Central line where, since the introduction of interval services between Manchester and Sheffield, most connections both from the south and from Lincolnshire are missed by 5 or 10 minutes, and where connections at Woodford for Oxford and the south and west also have been permitted to deteriorate to an atrocious state.

Ignoring the through York-Swindon and York-Bournemouth trains, the first train of the day arrives at Banbury at 8.8 a.m. from Leicester and connects with the 8.41 a.m. to Reading via Oxford after a rather lengthy wait of 33 min. Only one other train out of the remaining four makes what could be termed a reasonable connection with the Western Region train and that is the 1.12 p.m. from Woodford, which arrives at Banbury at 1.30 p.m., and connects with the 1.45 p.m. train to Bournemouth. Unfortunately, this train does not connect with any train from the north at Woodford except on Saturdays, when it provides a connection out of the noon train from Leicester! Of the remaining three trains of the day, the 10.10 a.m. from Woodford misses the 10.20 a.m. train from Banbury to Oxford by 8 min.; the 5 p.m. train from Woodford fails to connect with the 5.16 p.m. train from Banbury to Paddington, via Oxford, by a mere 2 min., and the 6.50 p.m. from Woodford misses the 7.5 p.m. train from Banbury to Reading by 3 min.! Although the northbound connections are not as bad as this, they cannot be regarded as good and such a timetable can only be described as a masterpiece of "mis-connections," which is bound to cause considerable misgivings in the minds of unfortunate prospective passengers regarding the managerial abilities of the B.T.C. and lead to widespread accusations of deliberate sabotage. Yet, despite this and many other discouragements to travellers, it is surprising that an appreciable number still do find that it is easier to travel on the Great Central than by any other means.

There seems little doubt that those senior officials of British Railways who have been responsible for the introduction of the "Trans-Pennine" services and other services of a similar nature on the North Eastern Region, and for the introduction of those enterprising services and connections radiating from Ely and on much of the Great Eastern line, should be congratulated by Dr. Beeching and given the opportunity to introduce similar ideas wherever there is a chance of their success throughout the British Isles in accordance with Mr. Mountain's plea.

The Western Region has already shown in South Wales and elsewhere that local and main-line interval services can be introduced with steam traction with resultant economies in the use of stock and with financial success without waiting for electrification or for diesel equipment to become available.

In conclusion, these arguments are not only the contentions of busybodies and railway enthusiasts, but of businessmen who are exasperated at the unnecessary withdrawal of train services which they have used in the past and badly need, and are also undoubtedly supported by many railwaymen ranging from humble booking clerks and train crews to railway officials of the highest rank and long experience.

Many members of the public find it amusing that British Railways, recently advertising the success of the early stages of the modernisation plan, quoted the improved Birmingham-Sutton Coldfield-Lichfield train service as the most successful example of the plan. This service improvement was long opposed by British Railways and persistently advocated over a long period by some of the busybodies whom Mr. Clinker criticises!

Yours faithfully,

PETER R. J. WALKER
Chairman, Great Central Association

57, Murray Road,
Northwood, Middlesex

The Scrap Heap

'Twre ever thus

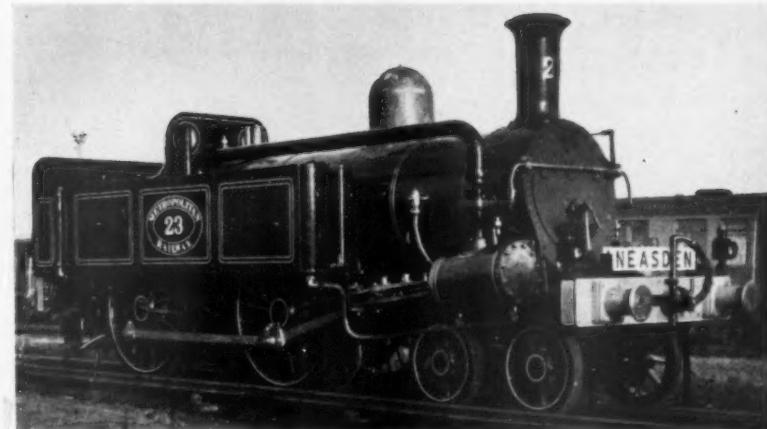
As a protest against what they consider is an unsatisfactory train service, the season ticket holders on the Burnham-on-Crouch branch have each forwarded a printed card to the management of the G.E.R. regretting that the service has not been accelerated, and requesting a connection at Wickford for all business trains to London.—From "The Evening News" of May, 1911.

Too close for comfort

The traditional frozen reserve of a British Railways train-to-work compartment melted on May 10. Open-window enthusiasts clashed with closed-window defenders. It happened on the 7.4 a.m. Bognor Regis to Victoria train, when about 50 passengers packed into the 36-seat compartment. One man was jostled off his feet near a window and a pane of glass was smashed. The closed-window brigade held the key positions. The windows were shut—and the heaters were on.

Highland capers

In *British Trains, Past and Present*, the author recounts how the occupants of private saloons on the West Highland line of the N.B.R. used to be persecuted by engine drivers who enjoyed a little fun at the expense of travellers. According to one who actually suffered in this manner, "there was a mischievous spirit haunting the shunting tank engines of Waverley. They used to put our saloon on a long empty bit of line, retire



"A" class condensing tank engine now preserved at British Transport Commission museum at Clapham

a mile or so (!) and then charge—biff. We did wish it was N.B.R. crockery instead of our own."

"The Old Girl"

The locomotive illustrated above, a 4-4-0 45-ton "A" class condensing tank engine built by Beyer, Peacock & Co. Ltd., was latterly numbered L.45 in the London Transport Executive fleet but has now been restored externally to its 1903 condition, and carries the number "23" which it bore in that year. It has been repainted in the Metropolitan crimson lake livery with yellow lining, and the cab has been removed, and the

chimney altered to conform to its earlier appearance. This particular locomotive was rebuilt three times—in 1889, 1903 and 1918. Affectionately known by its drivers as "The Old Girl," the locomotive worked trains on the Inner Circle from the time it was delivered until 1905 when the line was electrified. From then until 1914 it worked trains between Baker Street, Rickmansworth, Chesham and Verney Junction, after which it was relegated to shunting at Neasden, and occasional freight and coal train working. It was returned to passenger service a few years later when, with a sister locomotive, it hauled trains on the Brill Branch between Quainton Road and Brill in Buckinghamshire. It remained in service, hauling mixed passenger and freight trains, until the branch was closed in 1935. From then until 1948, it worked engineers' trains and shunted at Neasden and Lillie Bridge. The locomotive is now preserved in the British Transport Museum at Clapham.

Rawhide?

Viewers of some of the Western programmes currently to be seen on Television may take the view that the locomotives have the cylinder drain cocks permanently open. The escape of steam in the region of the cylinders did not necessarily indicate the drains were open. It was the practice on some American locomotives of the latter part of the 19th century to fit cocks which discharged steam for the purpose of scaring cattle off the tracks. Years later locomotives in Africa were equipped with nozzles for the purpose of blowing locusts off the rail head.



Photo]

"But there isn't another train for two hours"

OVERSEAS RAILWAY AFFAIRS

FROM OUR CORRESPONDENTS

EAST AFRICA

Projected new line

Consideration was given by the Transport Advisory Council to the possibility of building a railway in Tanganyika from Mikumi to Makumbako (227 miles). The project was approved in principle, and Management was authorised to continue negotiations with the Tanganyika Government for an early start on the first section of 24 miles from Mikumi to the site of a new sugar factory.

ARGENTINA

Recent accidents

A three-coach diesel train on the General Belgrano Railway running between Puente Alsina and Carhué was completely destroyed by fire near Henderson Station. The fire was caused by sparks from burning grass by the side of the line, which, in turn, was caused by the locomotive of a steam train which had passed earlier.

Another diesel coach on the same railway running between 9 de Julio and La Plata was also totally destroyed by fire near Garbarini Station. The cause of the fire has not been established.

The breaking of an axle was the cause of the derailment of a fruit train of the General Roca Railway near Emma Station. Damage to the amount of several million pesos was done to wagons and track, apart from the loss of the cargo.

A diesel-electric locomotive and three coaches of a local train on the General

Mitre Railway running between Victoria and Capilla del Señor became derailed at El Talar Station. There were no casualties, but extensive damage was done to rolling stock and installations.

A suburban train on the General Roca Railway from Glew crashed into the buffer stops at Constitución Station. Several passengers were injured but the hydraulic buffers prevented serious damage to the train.

VICTORIA

Suburban line doubling

The Victorian Railways Commissioners said today that a further 2½ miles of railway on the main electrified Gippsland line is to be duplicated from Narre Warren to Berwick. The work was expected to be completed by the end of June, when a double electric track would run from Melbourne to Moe, a distance of 77½ miles, with the exception of a small section between Bunyip and Longwarry. The new line would be equipped with automatic signals.

Settlement of labour dispute

The dispute that had paralysed weekend train services on the Victorian Government Railways for nearly a year was settled on February 2, 1961. Mr. Bolte, Premier of Victoria, announced on that date that Saturday afternoon country trains and Sunday train services would run again on the weekend, February 4-5. The settlement with the Trades Hall Council of Disputes Com-

mittee, representing the 15 railway unions, was in anticipation of the court agreement and necessary legislation by both Houses of Parliament. A Bill altering the Superannuation Act was promised for introduction in the coming session.

Stations unmanned at night

Because of staff difficulties, 76 suburban stations in the Melbourne area are at present unmanned for varying periods after the late peak period until the last train. The absence of staff at stations at night-time cannot be avoided until more men are available for training in station work, and arrears of annual leave and overtime work have been considerably reduced. There has been an encouraging improvement in staff recruiting, which is at its best for 12 years. Since last November the traffic branch has gained 600 men, and in recent weeks applications for railway jobs have averaged over 250 a week.

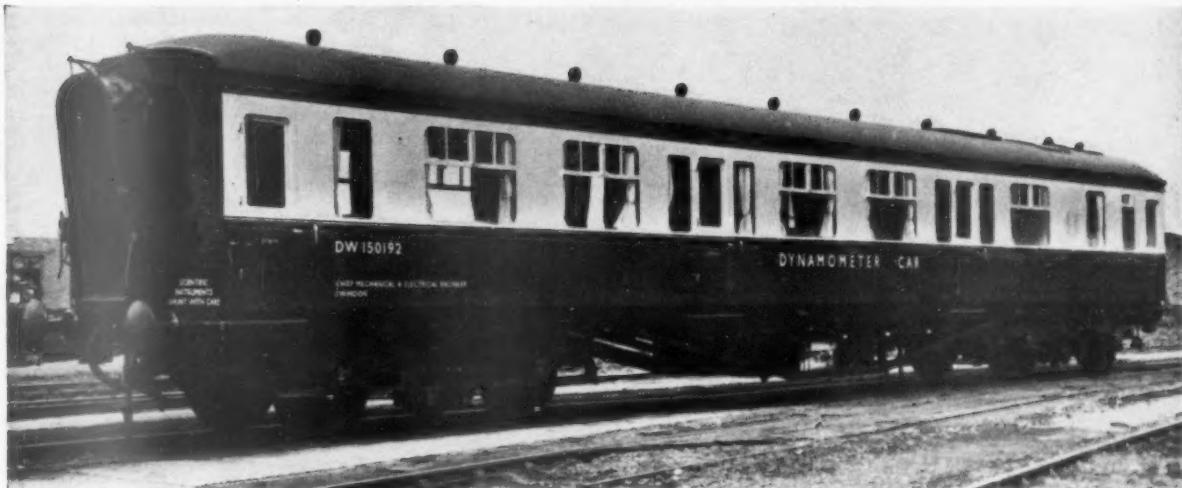
NEW ZEALAND

N.Z.G.R. exhibits

The illustrations below show some of the New Zealand Government Railways exhibits at the International Motor Show held at Napier in March this year. Among the exhibits were a Matisa track recording car, an experimental pneumatic-tyred motor trolley, a "Tr" Class 20-ton shunting tractor manufactured by A. & G. Price Limited, Thames, New Zealand, and a Landrover weed-spray unit.



New Zealand Government Railways exhibits at the International Motor Show at Napier



NEW DYNAMOMETER CAR for British Railways

FOLLOWING a lengthy analysis of present and future requirements for the track-testing of all types of locomotives and rolling-stock, a dynamometer car of unique design has been produced at the Swindon Works of British Railways, Western Region.

In the design and equipment of this car, provision has been made for the accurate testing and recording of test data over a wide field, of which the following are typical examples.

- (i) Controlled road testing, in which all the usual traction and resistance characteristics are obtained with the train running at the varying speeds of normal route operation. The information thus obtained over all sections of the region is charted by the test department in a form convenient for direct use by the traffic staff in compiling passenger and freight train schedules.
- (ii) Investigation of mechanical and electrical problems arising under normal working conditions of diesel and electric locomotives.
- (iii) Investigation of general problems such as adhesion, braking, stressing of components, and vehicle riding characteristics.

To undertake this very comprehensive range of testing, the car is equipped with the most modern potentiometric and electronic instrumentation, and in effect is a mobile laboratory.

By the use of electrical load cells as used for industrial weighing, instead of the orthodox hydraulic dynamometer equipment, it has been possible to convert an existing vehicle with the mini-

Electronic instrumentation and strain-gauge load cells incorporated in an unique design

mum of modification to the underframe and running gear.

The vehicle used is a 63-ft. corridor second class coach built in 1947. The underframe is of the four-truss type and carried on 9-ft. light pressed-steel bogies. The 11-ft. drawbars are articulated at the bogie underframe bolsters, and the normal drawhooks and couplings have been replaced by the stronger Continental patterns. Testing can thus be carried out

from each end of the car.

A diesel-powered alternator set has been installed to provide a self-contained source of stabilised electrical supply for operation of the electronic, potentiometric, and other types of instruments, for lighting and water heating, and for the electrical requirements of the self-contained heating system.

In the spacious dynamometer room is a permanent console for housing the



Traction control console and recording table



Mobile laboratory equipment in dynamometer car

traction recording and indicating equipment and the control equipment for the alternator set. Equipment and instruments required for special investigations are not permanently installed but are drawn from an instrument pool as required. This avoids the carrying, and subjecting to vibration unnecessarily, of instruments not in frequent use. Service connection panels and movable benches are provided for the operation of this supplementary equipment.

Three interchangeable transducer measuring elements of drawbar effort are provided in the following ranges: 0-10 tons, 0-20 tons, and 0-30 tons. Externally, all elements are 1 ft. 6 in. \times 4 in. dia., increasing to 5 in. for a length of 5 in. in the centre, the ends being screwed internally for the drawbar connections.

Essentially the transducers supplied by

Elliott Bros. (London) Ltd. consist of ground load-carrying billets, on each of which are mounted two strain-gauges of matched characteristics which enable their functions to be switched if and when necessary. One normally serves the effort pens of both main traction and effort-speed recorders; the other the effort member of the work integrator.

The gauge units are sealed and waterproofed and are completely protected by strong steel sheaths. A dummy takes the place of the measuring element at the non-test end, and dummies are used at both ends when the car is not testing.

Insertion of the measuring elements and dummies in the drawbars is effected through floor traps in the vestibules. Rubber springs at the articulated end of the drawbars relieve the measuring elements of severe shocks. The free

ends of the drawbars are suspended from spring pendulum links to avoid rubbing friction.

To prevent errors in effort measurement on curves, the buffers at each side are attached to the ends of a centrally pivoted swing link.

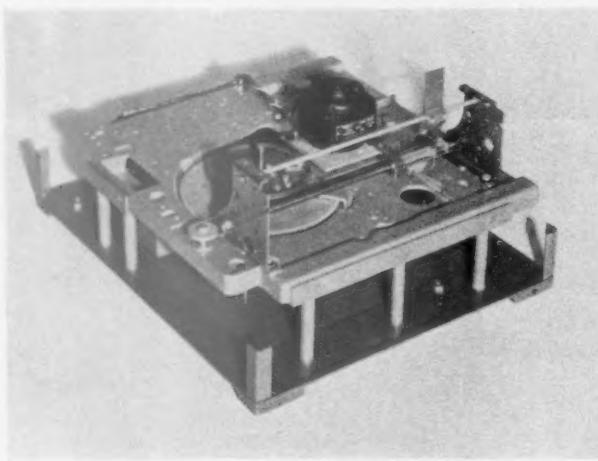
For measuring distance run, the tyre profiles of one set of wheels have an inclination of 1 in 100. To permit formation of these from the standard tyre section, the nominal diameter of all wheels has been fixed at 3 ft. 7 in., i.e. $\frac{1}{2}$ in. less than the standard as new. A gearbox, mounted on what is normally the seat of the driving pulley of the train-lighting generator, transmits distance run to the well of the traction console by a shaft drive. Compensation for tyre wear of the measuring wheels can be conveniently effected within the car. Brakes are not fitted to these wheels.

Traction console

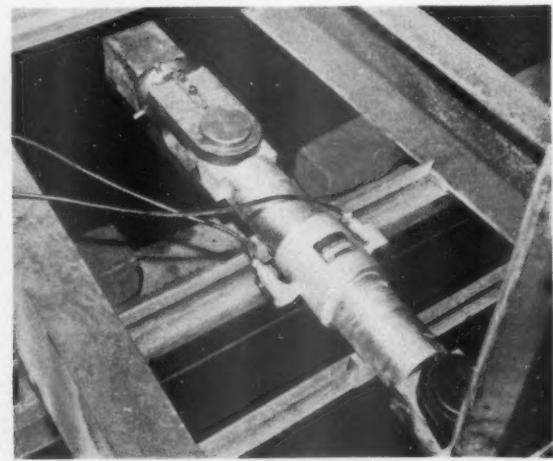
The traction console carries, in both forward- and backward-facing panels, large-dial indicating instruments of drawbar h.p., drawbar effort, train speed, locomotive airbrake pressure, and train-pipe vacuum; also of gradient and other track features on charts which move automatically at 2 in. per mile run. The indications on the one side are clearly readable from all parts of the supplementary instrument section and of the dynamometer room and, on the other, from the central control panel and main recorder, and from a conference room beyond.

The vertical panel on the central control side also carries the racks of the electronic time and counting units and counters of work done, mileage run, and distance run during braking and similar periods. The other panel carries the recorder of train speed either on a distance base or on a convenient time base. The same panel carries the XY recorder of drawbar effort and train speed.

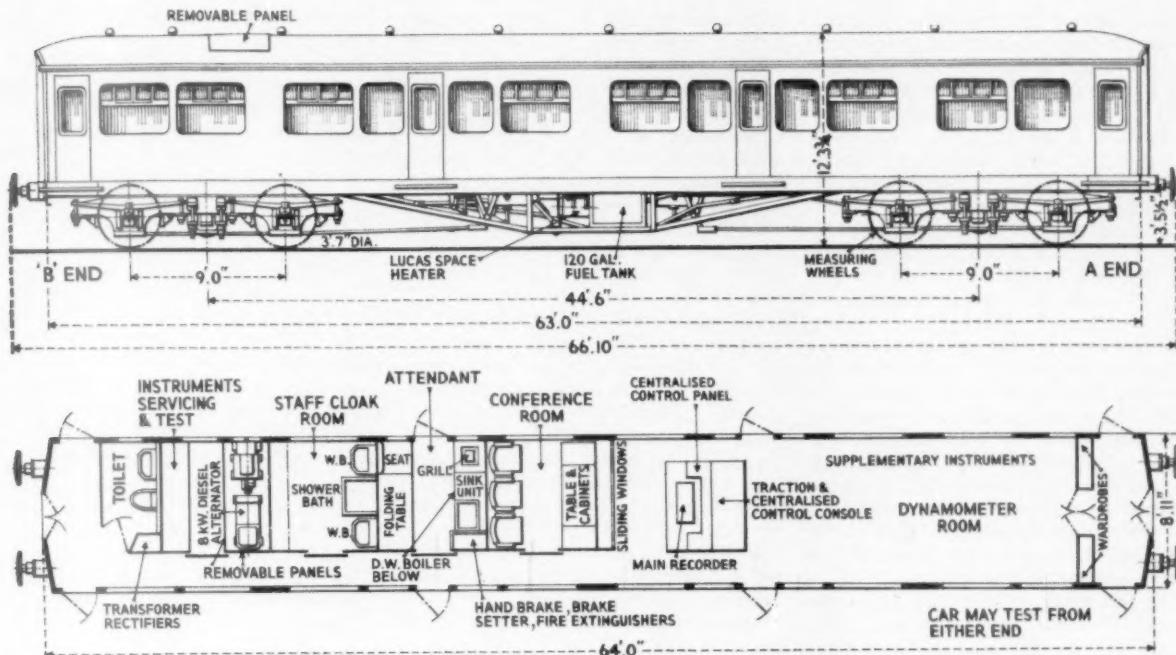
On the flat main recorder table a length



Dynamaster potentiometric bridge unit



Drawbar transducer measuring element



Side elevation and plan arrangement of dynamometer car

of 2 ft. 3 in. of paper band is exposed, the band passing from and to the concealed magazines below through narrow slits. The band is 1 ft. wide and the effort scale is 7½ in. for the full-scale deflection of each of the three load ranges, leaving room for eight instant marker pens without overlap or offset.

Allocation of instant marker pens

The instant markers are allocated to location by quarter-mile posts, time (at 0·1 and 1·0 min. intervals), work done (at increments of 1·0 and 10 d.b.h.p. hr.), and distance increments at choice, the remaining pens being available for fuel or other consumptions and for co-ordination purposes.

The electronic time and counting unit is in three parts, each housed in a standard 19-in. rack, these being the stabilised power pack carried inside the console, the 100-kilocycle crystal oscillator and the counter, both of which are mounted in the vertical panel of the console adjacent to the main traction recorder. A supply at 50 cycles is produced for operating the synchronous motors of the standard-time and elapsed-time clocks, and of the pulsing mechanism which produces the pulses that are used in normal traction recording.

Distance is measured by the revolutions of one of the axles, transmitted by shaft drive to the well of the traction console, where the shaft is coupled to the input end of a Croft's positive forward-neutral-reverse clutch and gearbox. From this the drive is taken to a splitter box which provides five output shafts running at 440 rev. per mile.

The transducer measuring elements of drawbar effort and speed are used with potentiometric bridge units of the standard dynamaster pattern made by the Bristol Instrument Company, these being a.c. or d.c. instruments as required.

All units are capable of a maximum output torque of 15 oz.-in. The unit measuring the drawbar effort is placed longitudinally in the centre of the console, simultaneously displacing the drawbar effort pen of the main recorder and the drawbar effort pen of the drawbar effort—train speed XY recorder.

Similar dynamaster units are used for charting other functions.

The centralised control over the electrical equipment is situated on sloping panels between the main recorder and the vertical panel of the console. The switches provided cover control of the alternator set, transducers, potentiometric bridge units, electronic time and counting unit, and various circuits of the main recorder.

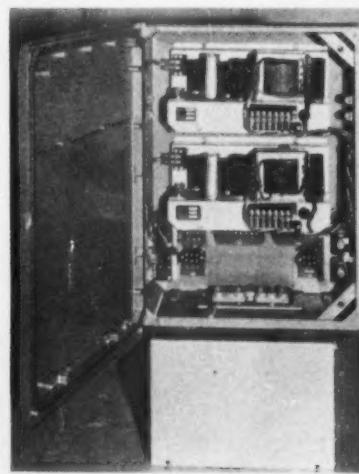
Conference room

The first compartment toward the B end is a conference room 7 ft. 2 in. long in maximum dimensions. A sliding glass window in the dynamometer room partition, extending the full width, enables the near indicating instruments of the traction and central control console to be viewed from a sitting position. Below the sill of this window, with access from the dynamometer room, are the racks for the drawbar tension transducers and dummies, amplifiers, and recorder sundries. Beneath, and just above floor level, is the inlet to the re-circulating air duct of the heating system. In front of the

dynamometer room window of the conference room is a table supported on two cabinets. An internal telephone system provides communication with all points.

The next compartment in the B direction is the attendant's. It is fitted with a stainless-steel sink unit with hot and cold taps, drinking water supply through a caravan-type pump which lifts water from four 4-gal. stainless-steel containers, a 4-gal. drinking water boiler with two-heat immersion heater, and an electric hot-plate and grill. Against the other partition is a seat and a 4-ft. x 2-ft. table.

The third compartment is a staff cloak room with two washbasins and a shower bath cubicle, all with hot and cold supply.



Drawbar effort-measurement amplifier

One-third of the fourth compartment from the dynamometer room is occupied by the 10-kW. diesel alternator operating on a power factor of 0.8. The Macfarlane 240-V. 50-cycle single-phase transicon alternator, is driven by a Lister two-cylinder four-stroke water-cooled engine.

Air is drawn by the engine-driven fan through a floor vent, whence it passes round the set and is expelled through the radiator and thence through louvres in the side panels. The 24-V. d.c. supply for low-tension d.c. instrumentation, emergency lighting, and engine starting is provided through a transformer-rectifier set which trickle-charges a 24-V. 108-a.h. heavy-duty Exide battery. The whole cubicle is screened and insulated. The compartment and corridor panels are removable for servicing the set *in situ* while a removable roof panel enables it to be removed for workshop repairs. The remaining two-thirds of the compartment is fitted out as an instrument servicing and test room.

In the nearby cubicle are the transformer-rectifier sets for charging the main and portable instrument batteries for the three-phase 400-cycle supply and for the electrical supply to the oil-fired space heater.

The B end vestibule is fitted with instrument lead traps and connection panels similar to the A end.

Mains voltage cables are taken through below-floor steel conduits. Instrument leads are carried in 6 x 2-in. screened ducting. The run between the vestibule

connection panels is placed on the corridor side, where it is immediately above the cant rail.

All ducting has hinged doors throughout, being flush with the roof panels when closed. The whole has been so arranged that leads may be laid out at floor level, harnessed, and lifted into position without threading.

Lighting is by four 240-V. 80-W. fluorescent light units in the dynamometer room and two 240-V. 100-W. filament lights in each compartment.

A Lucas combustion heater is installed for space heating. In this, combustion air and heating air are completely separate, each flow being induced by its own fan and filtered on entry. Temperature is sampled by the recirculation air, which can be varied between 70 per cent and 30 per cent, and the control thermostat is situated in the recirculation air duct.

A 125-gal. fuel tank suspended from the underframe supplies the diesel-alternator and heater.

Water supplies are carried in roof tanks of 150 gal. total capacity. For the hot-water supplies, a 30-gal. tank directly fed from the main tanks is fitted with a 3-kW. main immersion heater and a maintaining heater of 250-W.

Décor

Floors, walls, and roofs are lined with laminated plastic and insulated for sound and heat. The dynamometer room has a ceiling in cream and walls of light

"walnut," with the exception of the A end wall, which is "silver grey walnut." Floor covering, in marbled grey-green heavy-gauge linoleum, is renewable. The conference room is in "birds-eye maple" with a cream ceiling; floor covering is patterned in two shades of green, toning with the upholstery; furniture is in "walnut" softglow. Elsewhere, various light shades of plain and linette grey are used.

The design of the car was prepared to the requirements of Mr. R. A. Smeddle, Chief Mechanical & Electrical Engineer by his Research & Development (Rolling Stock) Office at Swindon. The conversion was carried out in the Swindon Carriage & Wagon Works, which was also responsible for building the permanent instrumentation and the manufacture of many of its components.

Main sub-contractors were as follow:—

| | | |
|---------------------------------|-----|---|
| Transducer measuring elements | ... | Elliott Bros. (London), Ltd. |
| Potentiometric bridge units | ... | Bristol Instrument Company |
| Speedometers | ... | Smiths Industrial Instruments Limited |
| Car heater | ... | Joseph Lucas (gas-turbine equipment) Limited |
| Portable laboratory instruments | ... | New Electronic Products Limited |
| Generating set | ... | S.F.I.N. (Great Britain) Limited |
| Telephone equipment | ... | R. A. Lister Co. Ltd. |
| Distance counter drive Gauges | ... | Standard Telephone & Cables Limited |
| Battery | ... | Crofts (Engineers) Limited |
| Battery charger | ... | Budnburgh Gauge Co. Ltd. |
| Magnetic counters | ... | Negretti & Zambra Limited |
| Immersion heaters | ... | Chloride Batteries Limited |
| | | Legg Industries Limited |
| | | Lancashire Dynamo Electronic Products Limited |
| | | Hatrae Limited |

Controlled road testing system

AN ESSENTIAL requirement of traffic staff in the compiling of passenger and freight train schedules is an accurate assessment of locomotive and rolling-stock performance under normal route conditions.

For maximum operating economy this assessment must show, in a form readily usable by operating personnel, the optimum speed and performance of any locomotive under the varying route conditions of load, gradients, and distance between check-points. Conversely, it must indicate the most suitable locomotive required to maintain timings over specified routes with maximum loading conditions.

Standardised use

To produce quickly this accurate assessment of performance the controlled road testing system has been evolved by the Research & Development (Rolling Stock) Department of Swindon Works, and is now in use by all testing organisations of British Railways.

Procedure evolved by British Railways for assessment of locomotive performance under normal running conditions

The controlled road testing system dispenses with braking units and employs a normal train running in the usual variable speed manner over normal routes. The fundamental difference between the two systems is that constant speed testing with braking units operates under the third law of motion while the controlled road testing system operates under the second law, which is the general equation of motion of a train.

Fuel consumption control

In the controlled road system, control is exercised over the rate at which the working medium is used by the power unit, e.g., steam in steam locomotives and fuel oil in diesel locomotives. When this rate is constant or is a function only of train speed, actual drawbar effort/train speed relation is uniquely defined and self-compensating for gradient effect.

For steam locomotives, necessary control is effected by using a specially-developed flow indicator, but in diesel locomotives it is even more readily obtained by placing the power controller in a pre-selected position where it must remain for the duration of the comparatively short test period required to cover the speed range.

Altering the load for various rates of working provides all the flexibility required and the necessary fuel consumption can be readily determined by recording and integrating units of consumption produced by positive fuel meters. The actual drawbar effort/train speed relation, as curve P_d in Fig. 1 on the following page, may therefore be automatically produced on Cartesian co-ordinates by an XY recorder, and readily where electronic and potentiometric methods are available for the speed function.

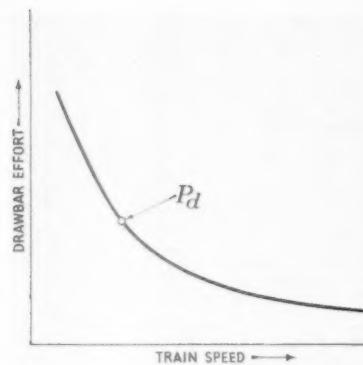


Fig. 1

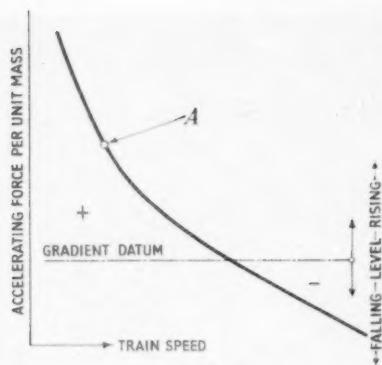


Fig. 2

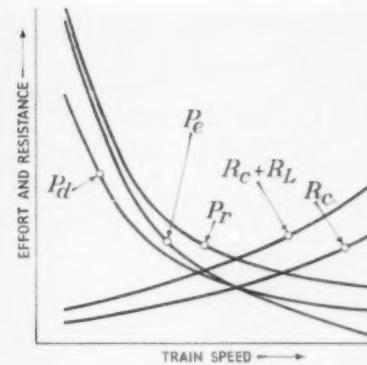


Fig. 3

Again, by these methods, acceleration can be measured accurately, making possible the production of the accelerating force per unit mass—train/speed relation, as curve A in Fig. 2, on Cartesian coordinates by another XY recorder. Compensation for the gradient effect must be introduced but, with the methods available, this presents no difficulty when a running indication of gradient is provided.

Train resistance curve

When values measured from the gradient datum of curve A are subtracted from those of curve P_d (in consistent units), as shown in Fig. 3, the ordinates of the resulting curve, as R_c in this figure, represent train resistance on level track in the same units. Multiplying values from curve A, measured from the gradient datum, by the locomotive mass, and adding the resulting values to curve P_d , curve P_e of Fig. 3 is produced, this repre-

senting the "equivalent" drawbar tractive effort on the level which is independent of train-load.

Traction effort curve

If the whole process be repeated when propelling the locomotive, which has its final drives disconnected for the purpose, what was the train resistance becomes the locomotive resistance on the level, R_c . By adding this to curve P_e the tractive effort at the rail is obtained, as shown by curve P_e in Fig. 3.

The system provides a valuable verification of the accelerating force/train speed relation where a separate recording, on suitable scales, of train speed on a distance or time base is included in the facilities provided in the dynamometer car. From the accelerating force/train speed curve and the known gradient conditions, the speed/distance curve can obviously be calculated, and if calculated and recorded curves agree, the accelera-

ting force/train speed relation as recorded is uniquely verified.

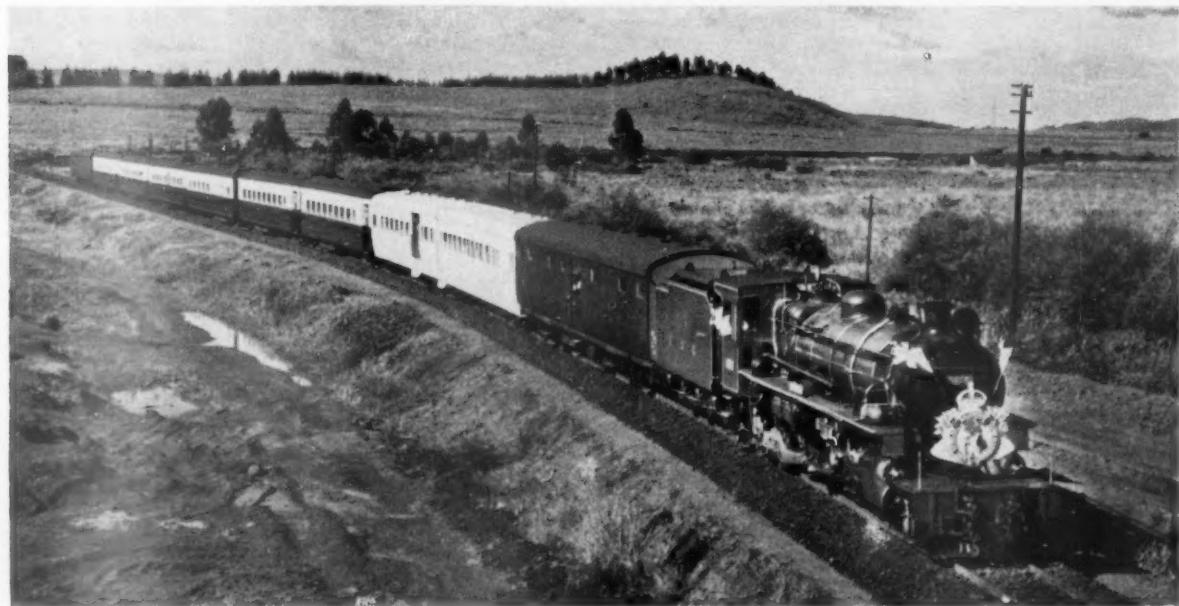
The provision of the above facilities largely determines the layout of the traction console. Though a master running record of all the principal functions is still a necessity, this record may be reduced to include little more than the prime functions, making relatively large scales possible within a comparatively narrow band of paper.

Movement of band

The band moves at 1 ft. per mile when on a distance base, but it may move entirely on a time base or change automatically from a distance to a time base when train speed falls below a predetermined value and back again when speed regains this value.

The Swindon dynamometer car described in the preceding article has been designed to obtain performance characteristics with this system.

OFFICIAL OPENING OF JINJA-BUKONTE LINE



Inaugural train hauled by "Basoga" locomotive



General view at night of sidings at Crewe

LIGHTING IN MARSHALLING YARDS

IN EVERY section of the industrial field the standard of illumination is continually rising—no longer is this trend confined to workshops and offices, but also to large open areas, such as railway marshalling yards.

It does not seem very long ago when the lighting in such places was confined to a gas mantle on a 12-ft. 6-in. standard, placed at long intervals, giving an intensity of illumination impossible to measure and acting purely as a guide to the pedestrian.

The advent of the mechanised hump shunting yard, with retardation controlled from a tower in the vicinity of the retarders, has necessitated the provision of a very good intensity of lighting over the whole of the switching area. It is also necessary for the operator to see the siding fullness and to be able to carry out normal working at night. For this reason, the whole of the siding area must be adequately illuminated.

Increased height and wattage

In recent years, the general tendency in lighting wide-open spaces has been to gradually increase the height and the wattage of the light source to provide greater spread of illumination, and to accomplish this without glare.

The North Eastern Region of British Railways has a modernisation programme which covers the laying-down of four very large marshalling yards, all of which

After consideration of successful installations in other Regions, the North Eastern Region of British Railways adopts high-tower lighting in all its new marshalling yards

by H. SAUNDERS, *Outdoor Machinery Engineer, North Eastern Region, British Railways*

have been authorised. The necessity for having the best possible lighting for these yards was immediately recognised, and much thought was given to the problem.

High-tower lighting

Many marshalling yards recently laid down have been provided with 50-ft. steel towers, each carrying three-colour corrected mercury-vapour lamps. This method has been found to give very good illumination indeed, but when applying this to the first of the authorised schemes on the North Eastern Region (Newport marshalling yard), it was found necessary to employ 188 50-ft. towers of this description to illuminate the whole area adequately. It was decided, therefore, to examine the question of high-tower lighting as being a better and more economical method of illuminating the large area involved. This consisted of approximately 160 acres.

It is interesting to recall early experiments in this type of lighting. These took place as long ago as 1945. Forty-six experiments were made in the Southern Region with several reflector-type

lanterns fixed to the underside of an old barrage balloon, and these proved the effectiveness of the system. As a result of these tests, the railway's first installation of high-tower lighting was carried out at Hither Green, where two towers were used to illuminate the sidings. Concurrently with this, the advent of football field floodlighting was taking shape, the splendid results of which are well known.

The first large-scale installation of high-tower lighting on railway premises was carried out at Crewe. The results obtained in this instance were extremely favourable and greatly influenced the decision to make use of all the advantages of high-tower lighting in the new marshalling yards of the North Eastern Region.

Intensity of illumination

The specifying of intensities of illumination on the horizontal plane in such areas as these is not always the criterion to the best type of lighting and, while in recent specifications for marshalling yards in the North Eastern Region, figures of 1 lumen per sq. ft. in the switch-

ing area and 0.6 lumen per/sq. ft. in the siding area have been quoted, it is recognised that more important features are necessary to achieve results. One of these features is the necessity for lighting to be thrown in two directions and to keep the throw of light mainly in the parallel line of the sidings.

Illumination at Newport

In the first marshalling yard in the North Eastern Region, namely at Newport, near Middlesbrough, the illumination will be by 11 towers only, each 150 ft. high and of the type illustrated. This method allows the whole of the area, which consists of an Up and Down marshalling yard each containing a primary and six secondary retarders and approximately 50 sidings, to be adequately

illuminated. A high-tension ring-main is fed to each tower, in the base of which is housed the ring-main unit, transformer and so on.

Some of the advantages to be derived from the use of this type of lighting are enumerated below:—

- i. Very even spread of illumination can be satisfactorily given over a large area, from a height sufficient to obviate dazzle and glare at ground level.
- ii. On an average the capital cost of the installation is cheaper than that of a method using 50-ft. towers. A large economy is effected in the amount of cabling required over the whole area.
- iii. The electrical distribution by high-tension ring-main gives what amounts



150-ft. lighting tower

to a small sub-station within the base of each tower. This is then available for the supply of other requirements around the yard.

- iv. The lighting is flexible and, after installation, alterations or additions can easily be made with very little extra cost.
- v. Maintenance is concentrated into 11 places instead of being spread over nearly 200 lighting towers. This concentration also obviates many obstructions in the area. This point always has value, but very much more so if a.c. electrification is to be introduced.

Effects of fog

Anxiety is always felt in connection with any lighting scheme in the open, bearing in mind its effect in fog, but there is no question that high-tower lighting is of greater value and help in thin mist or fog than illumination from lower light sources. In thick or dense fog no lighting is effective, but at least this type of lighting tends to give something appertaining to daylight fog rather than night fog conditions.

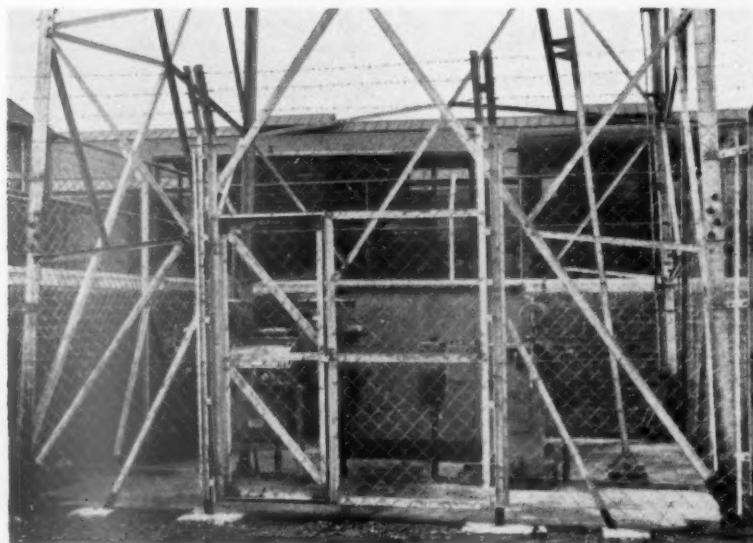
Tungsten lighting

One disadvantage must be mentioned. This is that, with the type of focusing floodlight fitting at present available, it is necessary to use tungsten lighting. This entails a much heavier current consumption than that used by mercury-vapour lamps, but there is no doubt that the increase in annual charges from this source is offset by the decrease in interest and depreciation charges on a smaller capital outlay.

We look forward to the day when research in this field will bring into use a lighting fitting in which we will be able to use a high-power mercury-vapour lamp, and so eliminate what at present would appear to be practically the only disadvantage of high-tower lighting in marshalling yards.



Another night view of Crewe sidings



Base of tower enclosure

COMPUTING SYSTEM on the Canadian Pacific Railway

THE electronic computing system described and illustrated on this page has been installed by the Canadian Pacific Railway at that company's head offices at Windsor Station, Montreal. It handles queries from the railway's airliners, passenger and cargo ships, and from its widespread office network. It also locates each airliner, ship, and moving train, computing the weight of each train and recording the track wear each produces on rails and roadbed as it progresses.

With its help, the Superintendent of Motive Power in each region can obtain information on the type and power of locomotive required for each train for maximum efficiency, speed, and economic operation. It is the first 705 data-processing installation in the world to incorporate a trans-receiving set-up. Its benefits have been so considerable that the railway has placed an order for another, and larger, installation. This is scheduled for delivery next year.

The system incorporates the following three principles:—

- (1) Recording on punched paper tape or punched cards at or near source of original data;
- (2) Processing these data exclusively by mechanical means;
- (3) Preparation by one person instead of by many of a mechanical record from which stem documents, reports, and other requirements called for by many departments.

Common-language machines make the original mechanical recording of data. The machines are in four parts, and comprise a tape punch, tape-reader, electric typewriter, and programme control. They produce a typewritten record and a punched tape simultaneously, either by typing on the typewriter reading tape through the reader, or both alternately.

The programme control operates the typewriter, tape-reader, and punch so that spacing, insertion of dates and numbers, selection of information and many other functions can be handled automatically. Fed from one machine to another, the tape is the common language between machines of different types and eliminates human errors of transcription.

Improved communications

The company's communications provide the computer with a 24-hr. service over a coast-to-coast network on carrier circuits, which enable many messages to be sent simultaneously over the same pair

First 705 data-processing installation in the world to incorporate trans-receiving facilities



Size and complexity of computer is seen here to good advantage

of wires. Microwave is used where wiring is impractical. Standard teletype equipment sends and receives tape at a rate of 368 digits per min., and operates over the telegraph system.

I.B.M. data transmitters send and receive punched cards at the rate of 880 digits or letters per min. These operate over telephone circuits, by messengers, or mail services.

Capacity

Operating on five-digit numbers, the computer can perform 8,400 additions or subtractions, 1,350 multiplications, 550 divisions, or 29,400 logical decisions in a second. Completed data can emerge on magnetic tape at the rate of 900,000 digits or letters per min., on cards at the rate of 8,000 digits or letters per min., and on printed forms at the rate of 60,000 digits or letters per min. The memory banks can store 20,000 digits or letters, and a magnetic drum can accommodate a further 60,000. Recall is achieved in 17 millionths of a second from the memory banks and in 40 millionths of a second from the drum. Doubled memory storage is to be installed.

These tools are combined to produce an integrated flow of data throughout the company's system to serve all departments at all levels. These data are recorded either manually, on common-

language machines, or on punched card equipment. The information recorded emanates from the following sources:—

- 1,500 freight offices and stations;
- 66 maintenance shops;
- Road transport;
- Ships at dock or at sea;
- 78 railway, shipping, or airway stores;
- 75 railway yards;
- Foreign agents throughout the world;
- Express offices located locally and abroad;
- The company's hotel network;
- Aeroplanes on the ground or in the air.

The information is passed to one of eight district data centres which collect information, recorded data not previously punched, process data for local purposes, and relay all information to Montreal for processing and distributing.

Constant operation

The centre in Montreal operates a 24-hr. day during a 7-day week. At present, it uses five million cards to produce 266,000 individual records on 145 printed forms. It is divided into four sections: transmission, key punching, conventional machine processing, and 705 processing.

This is the third electronic computer to be used by Canadian Pacific.

PERSONAL

Overseas

THE HONOURABLE ENCHE SARDON BIN HAJI JUBIR, Minister of Transport for Malaya, who has been visiting Britain under the auspices of the Minister of Transport of this country, was born in 1917 at Batu Pahat, Johore and educated at the Malay School there, and at Victoria Bridge School and Raffles Institution, Singapore. He came to the United Kingdom to study law and joined the Honourable Society of the Middle Temple in 1937, being called to the Bar in 1941. He returned to Malaya later the same year where he became Assistant Information Officer, Johore Information Services. During the Japanese occupation he was Assistant Registrar, Supreme Court and afterwards



Enche Sardon bin Haji Jubir

was attached to the Prosecutions Department. When the British Military Administration was set up he was Deputy Public Prosecutor. He was called to the Singapore Bar in 1947, and to the Federation Bar in 1948. He was the first Chairman of the Indonesian Red Cross Aid Society and in that capacity went to Djakarta in 1947. He was one of the founder members of the Malay Nationalist Party and became Executive Member in charge of Foreign Affairs. In 1946 he became a member of the Malay Union and from 1947 to 1951 was President of the Malay Union, Singapore. Enche Sardon was a Member of the Executive Committee of Muslim Missionary Societies, Young Men's Association, Malay Welfare Council, and the Muslim Advisory Board, and was nominated Municipal Commissioner, Singapore. He was the only Malay candidate for Rural East constituency and was returned to the first elected Legislative Assembly of Singapore. He was nominated member of Singapore Rural Board, and a member of the Review Committee. He also became a

member of the Government Finance Committee. In 1950 Enche Sardon acted as Solicitor to the Indonesian Consulate in Singapore and then moved to Johore Bahru in 1951, where he was nominated member of Johore Bahru Town Board and Johore State Council. In 1952 he was elected to the first elected Town Council, Johore Bahru, and was returned unopposed for the Kluang constituency in the first Johore State Council elections, becoming a member of the Federal Legislative Council in 1954. In 1955 he stood, and was elected as Alliance candidate for the Segamat constituency. In 1956 he attended the Ghana Independence celebrations as Representative of the Government of the Federation of Malaya. He has been President of the U.M.N.O. Youth since 1951, and was elected President of the Malayan Youth Council in 1958. He became Minister of Works in the Alliance Government and in a Cabinet reshuffle was appointed Minister of Works, Posts & Telecommunications in 1957. In 1959 he became Minister of Transport.

MR. W. E. BULMAN, who, as recorded in our issue of March 10, was appointed Acting Chief Mechanical Engineer, East African Railways & Harbours, recently, has been confirmed in the position of Chief Mechanical Engineer.

Institution of Locomotive Engineers

MR. J. F. HARRISON, Chief Mechanical Engineer, British Railways Central Staff, British Transport Commission, is to be the next President of the Institution of Locomotive Engineers. This was announced by MR. D. C. BROWN, President of the Institution, at the Golden Jubilee luncheon.

National Coal Board

SIR REGINALD AYRES has been appointed to be a part-time member of the National Coal Board.

Industrial

MR. J. B. MITCHELL has been appointed Technical Representative, Sheffield Area, Crofts (Engineers), Limited.

MR. F. R. SWINDEN, Works Manager, Sheffield Wire Rope Co. Ltd., has been appointed an Executive Director.

MR. C. S. SHAW, has been appointed Assistant Managing Director of R. H. Neal & Co. Ltd. of Grantham, one of the Steel group of companies.

British Transport Commission

The Minister of Transport has re-appointed SIR PHILLIP WARTER to be a part-time

member of the British Transport Commission until May 31, 1962. Sir Phillip Warter is Chairman, Southern Region Area Board, British Transport Commission.

MR. G. W. ROBSON, Assistant Running & Maintenance Officer, British Railways, Western Region, has been appointed Assistant General Manager.

MR. R. RANDALL, F.C.A., Assistant Accountant, Funds & General Division, British Transport Commission, who, as recorded in our April 7 issue, has been appointed Regional Treasurer, Euston, British Railways, London Midland Region, served his articles in the City of London, from 1933-39, and during the war saw service with the Army



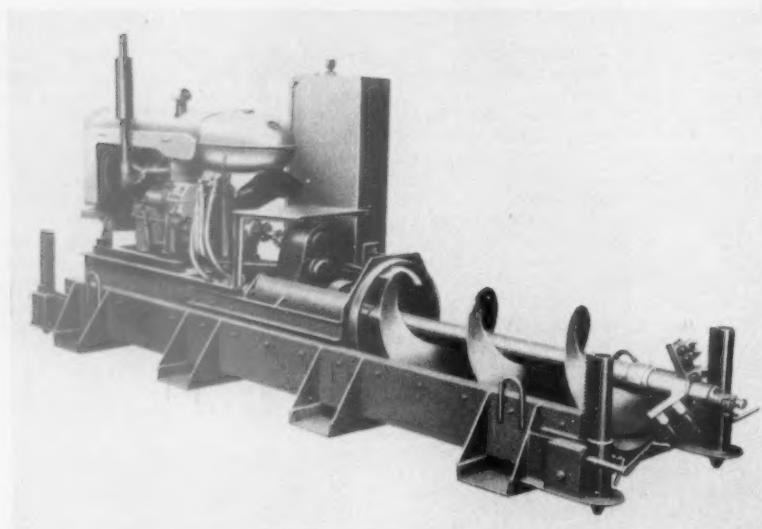
Mr. R. Randall

in Burma. Mr. Randall joined the B.T.C. in 1949, with the Acquisitions and Audit Divisions before transferring to the Funds & General Division in 1959.

MR. R. DELL, Signal Engineer, London Transport Executive, has been appointed a Chief Officer of the London Transport Executive with the title of Chief Signal Engineer. Mr. W. H. Challis, Principal Executive Assistant to the Signal Engineer, has been appointed an Officer of the Executive, with the title of Signal Engineer.

MR. H. L. HALL is to be Personnel Assistant, Line Traffic Manager's Office, Manchester, British Railways, London Midland Region; MR. T. R. HARRISON is to be Personnel Assistant, Line Traffic Manager's Office, Derby; MR. C. L. KELLY is to be District Motive Power Superintendent, Kentish Town; MR. A. S. PARKER is to be District Motive Power Superintendent, Wellingborough, and MR. D. C. J. GROVER is to be Assistant Estate & Rating Surveyor, Euston.

NEW EQUIPMENT and Processes



EARTH BORER

New British-built Taylor Salem borers are compact, readily-transportable, diesel-hydraulic machines which will simultaneously drill a hole and install pipe casings under embankments or wherever a communicating passage from one side to the other is required, without disturbing the surface or disrupting traffic flow.

The machines comprise a steel main frame carrying a sliding sub-frame, propelled by hydraulic rams, on which is mounted a manually-controlled power unit, clutch, four-speed gearbox, reduction gear, auger and auger head. This head is of varied construction to suit a wide range of ground conditions, including all types of compacted earth, clay, gravel, hardcore, sand, and soft limestone formations.

Drilling rate is in the region of 30 ft. per hr. under average conditions of packed clay or loam. This is for a drilled hole without sleeving, but where the hole is cased or sleeved the drilling speed can be increased.

The borer is capable of dealing with harder formations such as coal, sandstone, limestone, and similar rock formations, at speeds varying from 4 in. to 6 in. per minute, depending on the material, cutting head, and drilling experience of the operators.

Casings to protect the tunnel from subsidence are welded section by section as they are assembled on the machine before being hydraulically pressed home. Augers are a standard length of 6 ft. and matching casings should be used. The length is determined by the travel of the sliding carriage, which is 8 ft.

This allows a minimum of 1 ft. at each end of the casing to couple up the following auger.

In general practice, the borer operates in a small trench dug to the depth at which the pipe is to be laid. The borer is placed in the trench and levelled up. The auger head and first auger section are lowered on the carriage together with the first pipe-casing section, if a casing is to be used. The auger is coupled by male and female square-coupling shanks, on the drive shaft and fastened by quick-release coupling pins. The machine is then set in motion—turning the auger through reduction gearing from the diesel engine—and pushing the casing or pipe by hydraulic rams. When the pipe and auger are within a foot of disappearing the machine is stopped, the auger uncoupled and the machine retracted simply by reversing the hydraulic rams. Another auger and pipe section is placed on the machine—the new auger section connected to the old and to the machine—and the pipe lined up and welded around the complete seam. The boring and pushing operations are recommenced and continued in identical manner until break-through is achieved.

Three different models are being produced which respectively will accept augers up to 12 in., 16 in. and 24 in. It is possible to bore holes up to 48 in. dia. by using a back reamer attachment on the largest model.

The longest hole yet bored in one operation is 250 ft. in length, but the manufacturers claim that it will be possible to bore as far as 500 ft. and even longer borings are possible by carrying out the operation in stages.

Full particulars are available from F. Taylor & Sons (Manchester) Limited, Salford, Lancs.

PLASTIC FLOORING

Denodekk is a new plastic flooring, based on a new type of polyester, selected filling agents, and pigments.

It has many possible applications in the railway field, including use as a surface for steel servicing platforms, and as a waterproofing and protective coating for bridges.

Denodekk is reported to have excellent adhesive qualities. Exposure to temperatures varying from 100 deg. C. to -20 deg. C., for periods of 24 hours, produced no noticeable effect. It is highly resistant to water, acid, oils, fatty acids, petrol, lubricating oils, saline solution, lactic acids, and so on.

Applicable to concrete, iron, and woodwork, it is available in five colours. Treated surfaces may be again used 8-12 hours after application. If necessary a coating as thin as 1.5 mm. can be laid.

Additional information can be obtained from Bitulac Limited, Collingwood Buildings, Collingwood Street, Newcastle-upon-Tyne, 1.

AUTOMATIC DIFFUSER

The Fume-O-Dor automatic diffuser is a machine for dispensing into a stream of air predetermined and time-controlled quantities of insecticides, deodorants, disinfectants, reodorants, etc.

The unit consists of a 25W fan which will recirculate some 16,000 cu. ft. of air per hr., and an electric pump and atomiser which will inject a very large range of liquid products into the air stream. Particle division is very fine and the vapour is virtually invisible, and according to the diffusion rate used—24, 40, or 240 diffusions per hour—one charge of liquid will last from a few days up to about two weeks.

In addition to the many applications of the different chemical substances available, the diffuser can be used for maintaining enclosed atmospheres at a required humidity level.

The machine, which weighs 18 lb., is supplied with a pivoted stand for ceiling, wall or table fixing; it can be used as a portable appliance if required. It is sturdily constructed, and is 11 in. high (13 in. on stand), 16 in. wide, and 9½ in. deep.

Further details may be obtained from Fume-O-Dor Limited, Brook Street, Whitchurch, Cardiff.

ROLLING-STOCK EXHIBITION at Marylebone

THE exhibition of rolling stock, arranged by the British Transport Commission, in conjunction with the London Midland Region, as part of the golden jubilee celebrations of the Institution of Locomotive Engineers, was visited by H.R.H. The Duke of Edinburgh on May 12, when a large gathering of members of the Institution and their guests attended.

The exhibits, which included every form of motive power in use, and examples of passenger stock, were chosen to show the latest developments and illustrate some of the landmarks in steam locomotive design since the beginning of the century.

Steam locomotives

Steam locomotives were four in number and were all engines which have been scheduled for preservation.

The Class "4 P" 4-4-0 Midland compound No. 1000 is the sole remain-

Locomotives and rolling stock displayed on the occasion of the Institution of Locomotive Engineers golden jubilee

ing survivor of the once-numerous type introduced by Mr. S. W. Johnson in 1902. The high-pressure cylinder is 19 in. x 26 in., and the low-pressure cylinders 21 in. x 26 in. Coupled wheel dia. is 6 ft. 9 in. In working order engine and tender total 104 tons.

Mallard, the Class "8 P" 4-6-2 No. 60022 achieved the world-record speed of 126 m.p.h. in 1938. It is one of Sir Nigel Gresley's A4 class, usually regarded as his masterpiece. The three cylinders are 18½ in. x 26 in. Coupled-wheel dia. is 6 ft. 8 in., and weight of engine and tender 165 tons 7 cwt.

The Class "8 P" 4-6-2 locomotive No. 71000 *Duke of Gloucester* is the sole example of its class. It ranks next

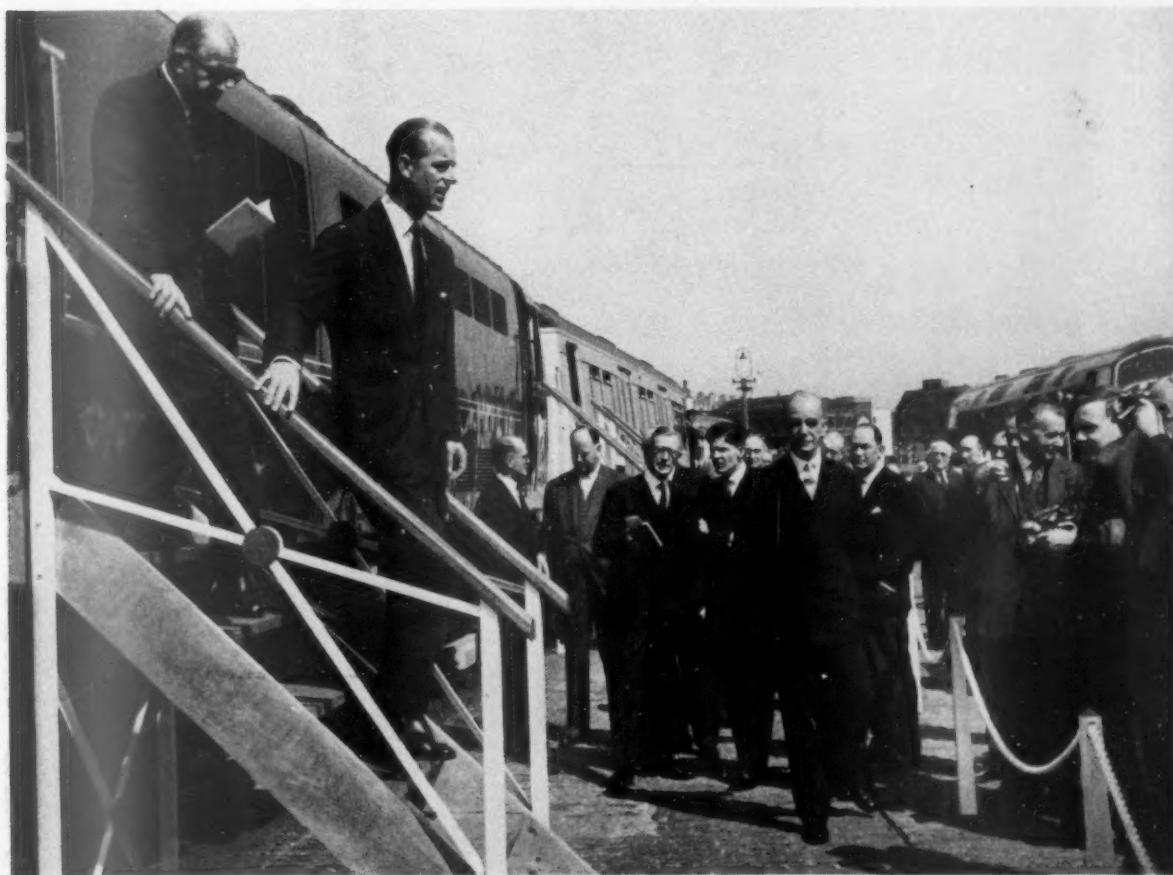
to the 2-10-0 as the most powerful of the B.R. standard locomotives. It has Caprotti valve gear. The three cylinders are 18 in. x 28 in. The dia. of the coupled wheels is 6 ft. 2 in. Engine and tender weigh 154 tons 19 cwt.

Latest construction

Evening Star, Class "9F" 2-10-0 was the last steam locomotive to be built for British Railways and the 999th steam locomotive of the standard range.

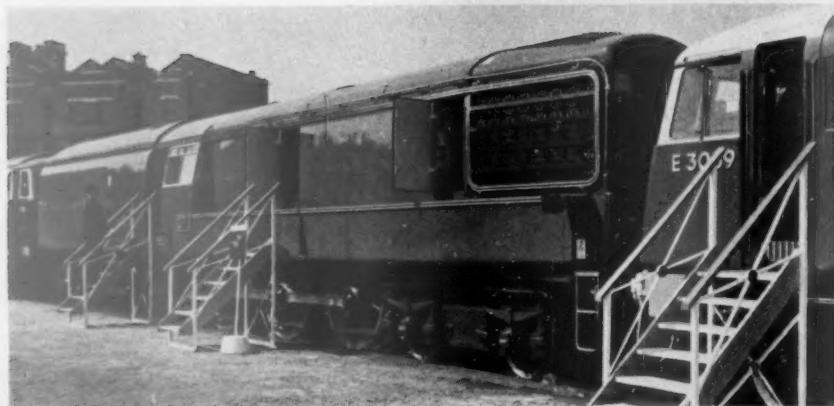
The two cylinders are 20 in. x 28 in. Coupled wheel dia. is 5 ft. Engine and tender weight is 139 tons 4 cwt.

This class of locomotive is one of the most successful, as well as numerous, in Britain.

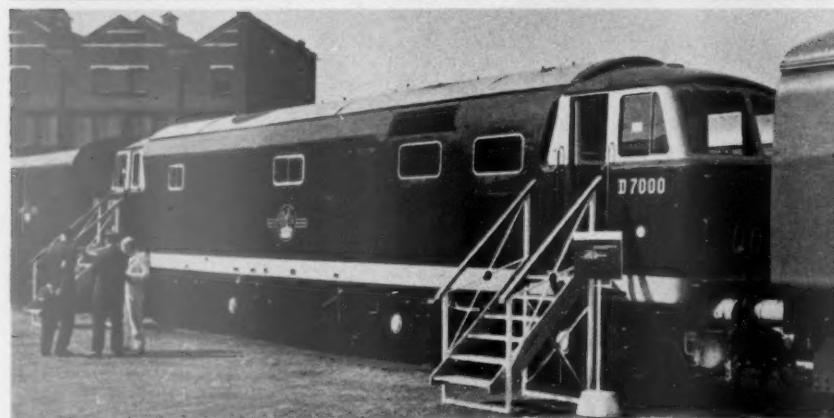


The Duke of Edinburgh, followed by Mr. D. C. Brown, leaving one of the exhibits

English Electric Type 5 3,300-h.p. "Deltic" main-line diesel-electric locomotive



English Electric 2,700-h.p. 4-6-0 gas-turbine locomotive, now undergoing trials



Beyer Peacock (Hymek) Type 3 1,700-h.p. diesel-hydraulic locomotive (see page 554)



Motor car of multiple-unit train for Marylebone suburban service, built by B.R. at Derby

The 4-6-0 oil-fired gas turbine locomotive, No. GT3, built by the English Electric Co. Ltd., had an English Electric EM27L gas turbine of 2,700 h.p., developed for diesel mechanical drive. A simple reverse and reduction gearbox were employed.

Diesel & electric

The B-B Type 1 1,800 h.p. example was built by the North British Locomotive Co. Ltd. for the Eastern Region. It was equipped with a Paxman 16Y4XL engine and General Electric transmission and control equipment.

The A1A-A1A Type 2 was one of the 1,365 h.p. locomotives built by Brush Electrical Engineering Co. Ltd. and powered by a Mirrlees J.V.S. 12T engine.

Type 3 was represented by a B-B 1,550 h.p. example, incorporating a Sulzer 8LDA28 engine and Crompton Parkinson electrical equipment, built by the Birmingham Railway Carriage & Wagon Co. Ltd.

The 1-C-C-1 Type 4 2,500-h.p. locomotive, built in B.R. shops, was fitted with a Sulzer 12LDA28 engine and Crompton Parkinson electrical equipment.

The Type 5 3,300 h.p. "Deltic" was built by the English Electric Co. Ltd., and had two 1,650 h.p. Napier-Deltic engines. It exemplified the largest single unit contemplated by B.R.

The B-B Type 3 1,700-h.p. locomotive by Beyer-Peacock (Hymek) Limited had a Bristol Siddeley Maybach MD870 engine and Stone-Maybach Mekydro K184U hydraulic transmission.

Built at Swindon, the B-B Type 4 of 2,200 h.p. had two Maybach MD650 engines and two Mekydro K104 hydraulic transmissions.

The B-B 2,500 h.p. d.c. locomotive was one of the E5000-E5013 series built at Doncaster for the Southern Region. Electrical equipment was supplied by the English Electric Co. Ltd.

A.C. locomotives were represented by the 3,200 h.p. B.B. locomotive, of the E3056-E3095 series, building at Doncaster for the Manchester-Liverpool-London electrification.

The 25kV motor car for the London, Tilbury & Southend line, accommodated all the traction equipment of an electric multiple-unit train. It was built by B.R. at York, and incorporated English Electric equipment.

A semi-saloon diesel motor car, for the Marylebone service, had two B.U.T. engines each of 230 h.p. The car was built by B.R. at Derby.

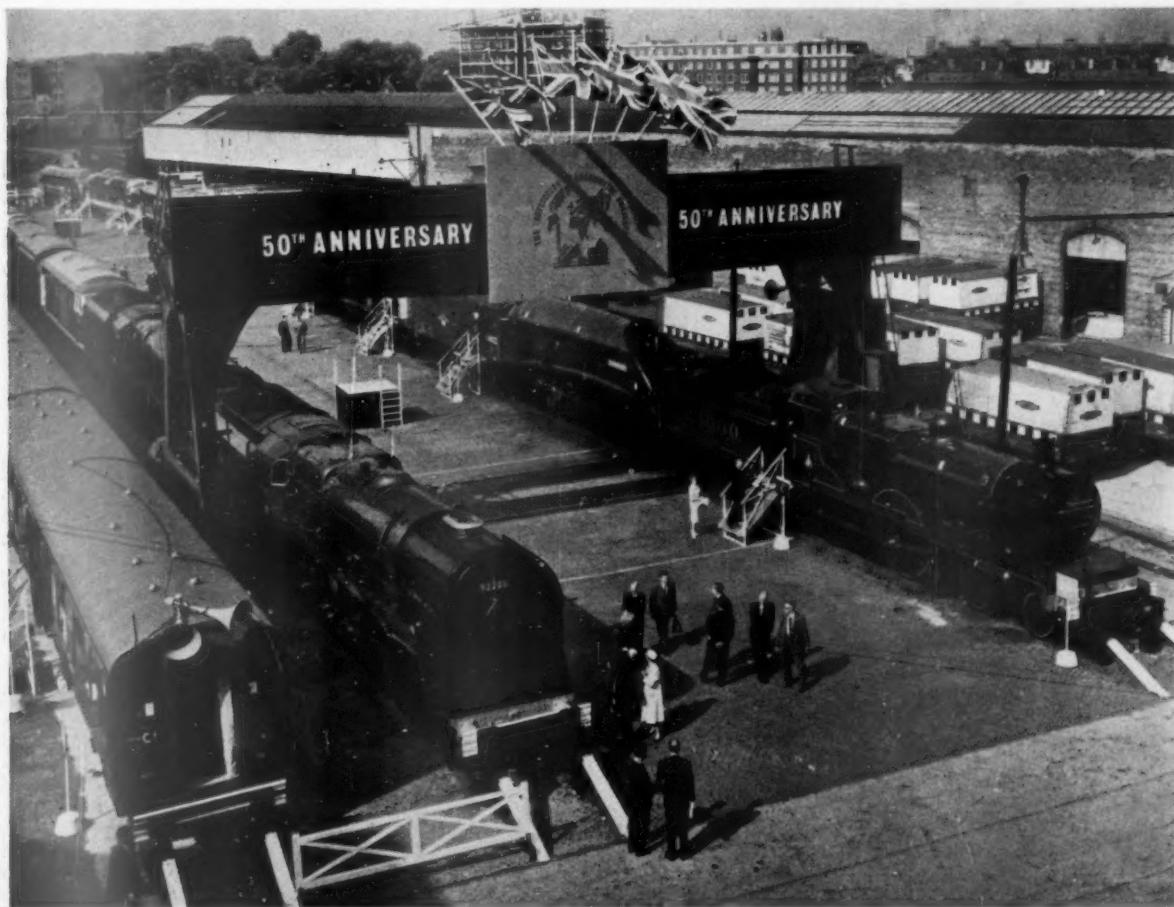
L.T. exhibits

The London Transport Metropolitan-line driving motor coach was built by Cravens Limited, and had four General Electric Company's 66 h.p. traction motors and Associated Electrical Industries control equipment. The coach body was of light-alloy and reinforced plastic.

The London Transport Central-line driving motor coach had two 80 h.p. G.E.C. motors, and A.E.I. control equipment. The coach was built by the Metropolitan-Cammell Carriage & Wagon Co. Ltd.

Rolling stock exhibits included a dynamometer car (described and illustrated in this issue), restaurant-buffet car, second-class sleeping car, and two vehicles forming a mobile diesel-training school.

Some 22,000 people attended the exhibition, 20,000 visiting it on the two days which it was open to the public. The photos on this and the previous page were taken prior to the opening.



Locomotives and rolling stock assembled at Marylebone Goods Station

European Railways Publicity

The control committee of the publicity section of the Information and Publicity Centre of the European Railways (CIPCE) held its second meeting in Lausanne on May 4 and 5, under the chairmanship of Signor Branca, Deputy General Manager, Italian State Railways. Mr. G. M. Leach, International Traffic Officer, British Transport Commission, attended the meeting in his capacity as Chairman of the Passenger Traffic Committee of the UIC, and British Railways was represented by Mr. M. B. Thomas, Public Relations and Publicity Officer, British Railways Eastern Region.

The committee examined a scheme to publish two or three times a year a special brochure devoted to general subjects which are of interest to the railways. The first brochure, which will be edited and is to appear during the summer, will be devoted to the Trans-Europ-Express services, and will contain a foreword on the organisation of CIPCE and UIC. The text will be in four languages, German, French, English and Italian.

A poster on TEEM services is to be produced to draw the public's attention to the steps which the railways are taking to provide every passenger and goods traffic facility. It is also proposed to design a UIC emblem which would appear together with the CIPCE initials on the various posters and pamphlets.

A request, made by London Transport Executive, to become a member of CIPCE was supported by the committee and the matter will be submitted to the board of management which will take a decision on 1 June. So far, the members of CIPCE are as follow:

Austria, Belgium, Denmark, Finland, France, Germany (DB), Great Britain, Greece, Ireland, Israel, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland (CFF), Switzerland (Bernese Alps), Turkey and the Sleeping Car Company.

The committee decided that the layout

of the 1962 edition of the CIPCE timetable brochure would be the same as at present, with the exception of the colour scheme of the cover which would be changed in order to avoid any confusion with the 1961 timetable.

C.T.C. between York and Beverley

The North Eastern Region of British Railways has placed a contract with the Westinghouse Brake and Signal Co. Ltd. for the provision and installation of colour-light signalling operated by centralised traffic control, between York and Beverley, on the York-Hull line. The scheme involves the singling of the 31½ miles of double track between Bootham Junction, near York, and Beverley North Signalbox, 8½ miles from Hull, leaving double-line connections some 1,000 yds. long approaching the two junctions, and passing loops ½ mile long at Pocklington and 1½ miles long at Market Weighton. A number of intermediate signal boxes will be dispensed with, and automatically-controlled half-barriers will take the place of the conventional manually-operated level-crossing gates.

There are at present 23 manually-operated level crossings on this route. Attendants will be retained at three of these (Haxby Road, Earswick Station and Market Weighton West) where road traffic is heaviest. Shipton Lane crossing will be abolished and its little-used roadway diverted to connect with the adjacent Londesborough station crossing. The remaining 19 will be converted to the latest type of automatically-operated "half-barriers."

In the Centralised Traffic Control, housed in the large modern signalbox at York, will be a console, comprising an illuminated diagram on which is automatically produced an overall picture of the position and movement of trains throughout the line and the positions of the automatic half-barriers, with thumb switches for the operation of points and signals and for the control of the

ground frames and manned level crossings.

Seven of the ten intermediate signalboxes will be closed completely, those at Pocklington and Market Weighton being retained for the control of shunting movements, and at Market Weighton, to control traffic over the junctions of the Selby—Market Weighton—Driffield route. The sidings at other stations on the line will be equipped with ground frames operated by the train crews. Control will be passed to the staff concerned by the centralised traffic control operator at York. Wayside interlocking circuits and apparatus will be installed at 11 field stations, some of which will be accommodated in the existing signalboxes. Points at the junctions and passing loops will be power-operated, and telephone communications will be provided between the centralised traffic control operator and the colour-light signals, level crossings, ground frames, stations, power-point locations, and field stations.

This project, one of the biggest centralised traffic control installations in the country, will enable considerable economy to be made in the operation of traffic over the line, as well as in maintenance and renewal. As a pilot scheme it will also furnish valuable information and experience on which to establish the place of centralised traffic control in the British Transport Commission's modernisation plan.

Signal school for West Midlands

A school for the basic training of signalmen in the West Midlands Division of the London Midland Region of British Railways has been opened at Sutton Park Station.

To simulate working conditions, a model "O" gauge track has been set up in the classroom. The layout consists of a double-track main line, double-track branch line, lever frames, upper-quadrant signals, catch points, and points and crossovers. Controlled clockwork is used to haul the two trains, one passenger and one freight, and the lines are track-circuited for block working.

The model layout is used in conjunction with a normal range of block telegraph signalling instruments. Accommodation is provided for 25 trainees, the period for basic training being six weeks in the classroom and six weeks in a signalbox.

At the opening of the school, which was performed by Mr. J. H. Hambidge, District Operating Superintendent, Birmingham, Mr. George Dow, Divisional Traffic Manager, stated that the divisional signalling staff was 20 per cent below establishment, 83 of these vacancies being in the Birmingham area.

This is the third school to be established at Sutton Park station, where there is a school for guards and for motor vehicle drivers.

TEMPERED GROUP, LIMITED, ACQUIRE COMPANY

Tempered Group, Limited, Sheffield, has acquired the entire issued share capital of Henry Rossell & Son, Ltd., Sheffield. The new board of Rossell's will comprise Mr. G. Young, Mr. H. Young, and Mr. C. Graham Murray. Mr. K. G. Settle will continue as Secretary. In addition to Henry Rossell & Son, Ltd., and Alfred Beckett & Sons, Ltd., the Tempered Group incorporates the Tempered Spring Co. Ltd., Tempered Rubber Components, Limited, and Bergen Tempered Limited.



Mr. George Dow and Mr. J. H. Hambidge at Sutton Park signal school opening

Parliamentary Notes

Anxiety of railway staffs in East and Central Africa

Anxiety of railway and other staff organisations in East and Central Africa about their service conditions under self-government was expressed in the House of Commons on May 11.

Mr. J. L. Callaghan (Cardiff S.E.—Lab.) asked the Secretary of State for the Colonies if he would give a list of the Civil Service representative organisations in East and Central Africa from which he had received representations about their future conditions of service during the last six months, and what machinery exists for settling these grievances.

Mr. Iain Macleod said he had received representations on various aspects of conditions of service from a number of associations, a list of which he would be circulating in the Official Report. Representations were submitted under the provisions of Colonial Regulations, and full consideration was given to them in consultation with the Governor of the territory concerned or the Administrator of the East Africa High Commission. He had met representatives of several of the associations, either in East Africa or in London.

Mr. Callaghan asked him if did not think, in view of the astounding spate of complaints which were being made about the implementation of the Flemming Report, that some new machinery might be needed to arbitrate between himself and the Treasury, on the one hand, and the Colonial Civil Service, on the other, as undoubtedly they were feeling a strong sense of grievance?

Mr. Macleod said he had received a great number of delegations recently and a considerable number of representations about East Africa. That was not surprising either, because Tanganyika was moving swiftly towards independence. That had repercussions in that territory and in others, and naturally all the associations wrote to inquire about these matters. On the question of whether there should be arbitration or not, he thought that associations should be—as they were—fully consulted. Representations were part of the machinery and it was inevitable that these matters should be considered on a Government basis.

Mr. J. D. Tilney (Wavertree, Liverpool—Con.) asked if the implementation of the Flemming Report would bring great benefits to those at present serving, and that overstatement of their case by some associations was to be regretted.

Mr. Macleod said that the surest proof of that was the anxiety found among people and staff associations representing other territories not covered by the original Flemming Report to have similar conditions of Service attached to them.

Questions in Parliament

Railways study group

Mr. Charles Mapp (Oldham E.—Lab.) asked the Minister of Transport on May 10 if he would make a statement on the work of the Study Group set up by him on October 26, 1960, to study modernisation and rationalisation of the railways; and if he would ask for an interim report from them and arrange to publish it.

Mr. Ernest Marples said in a written answer that this Group was a part of the normal and continuing procedures for consultation between the Commission, himself and his advisers. There was no question of reports or their publication.

Traffic assessment staff

Mr. Mapp asked the Minister of Transport if he would give the number, designation and cost of the additional staff to deal with traffic assessments indicated in paragraph 20 of Command Paper, No. 163, of March 28; and what proportion and which designation of such staff had practical experience of railway operations.

Mr. Marples said in a written answer that the additional staff provided were an Assistant Secretary, a Chief Statistician, two Statisticians, and six Executive and Clerical Staff; their salaries totalled about £15,000 a year. None of them had practical experience of railway operations.

Regional accounts

Mr. Mapp asked the Minister of Transport if he would explain the basis of regional accounts for the railways as set out and approved by him in paragraph 39 of Command Paper, No. 163, of March 28; and what cost would be involved to the British Transport Commission in addition to the present regional accountancy analysis.

Mr. Marples also in a written answer said that the British Transport Commission, on the general basis of a report from their professional advisers, were now working out detailed arrangements for producing regional trading accounts. No particular basis had been submitted or approved. The Commission was not yet in a position to estimate any additional costs involved.

Rolling stock, signals, and lines

Mr. Francis Noel-Baker (Swindon—Lab.) asked the Minister of Transport whether he would direct the British Transport Commission to supply, for publication together with the 1960 Annual Report, the following figures, namely, the age distribution of rolling stock, the total number of signals and the number which are colour-light and semaphore-arm type, and the classification of running lines.

Mr. Marples told him in a written answer that no useful purpose would be served by the proposed direction.

Fish train complaint

Mr. Cyril Osborne (Louth—C.) asked the Minister of Agriculture and Fisheries on May 11 if he had studied the complaints, details of which had been sent to him, of a Cleethorpes fish merchant whose fish arrives by train in Leeds early in the morning but is not delivered to the Leeds fish market till 7.30 a.m. whereas fish from Aberdeen is delivered at 6 a.m.; and, in view of his responsibilities for the efficient distribution of fresh food, if he would make representations to the British Transport Commission to speed up deliveries of fish from Cleethorpes to the Leeds market.

Mr. C. Soames, Minister of Agriculture, Fisheries & Food said he had been in touch with the British Transport Commission who had asked for more details, after which the British Transport Commission would be glad to investigate the matter.

Europe's biggest signalbox

Mr. K. W. C. Grand, Chairman of the Railways Sub-Commission of the British Transport Commission, formally opened the new Glasgow Central signalbox on a visit to the city recently. Mr. Grand was accompanied by Col. D. H. Cameron of Lochiel, Chairman, Scottish Area Board, Board Members, Mr. James Ness, General Manager, Scottish Region of British Railways, and other railway officials.

In a speech following the opening, Mr. Grand said that history was repeating itself, for the old lever-type signalbox, installed in 1907, was the largest of its type in Europe, and the new box, with a control desk operating more than 1,000 routes, has Europe's largest route relay interlocking system. He said that from the many signalboxes he had seen, in America, Europe, and the rest of the world, this was the most modern in conception, design, and equipment, and the Scottish Region was to be congratulated on a marvellous bit of planning, and great enterprise in building a signalbox worthy of any in the world.

To commemorate his visit Mr. Grand presented Mr. John Anderson, a regulator, with a desk blotter, and Mr. Thomas Berry, another regulator, with a perpetual calendar. Both men have been signalmen since the 1920s, and they control priority of the 400 trains which daily enter and leave Glasgow Central Station.

When Sir Brian Robertson, Chairman of the British Transport Commission, recently visited Scotland, he also saw the signalbox.

The new box controls all movements of traffic on 11 miles of track from Larkfield Junction and Cook Street signalboxes to Central Station, and there are a number of innovations. Among them is a system of selecting availability of routes by pre-illumination of route set lights, of a different colour to the normal white lights.

Civil engineering plant on show

British Railways, North Eastern Region, is staging an exhibition at Ponteland Station, from May 30-June 5 of some 70 items of modern plant and equipment used in railway civil engineering.

The exhibition has been arranged in connection with the 1961 convention of the Permanent Way Institution, to be held at Newcastle upon Tyne from June 3-8, and has been extended to cater for the Commonwealth Technical Training Week. Delegates to the convention are to visit Ponteland on June 5, but to give the public a chance of seeing the interesting items on display, the exhibition is open, free of charge, on the other days. School parties will have the opportunity of visiting the exhibition as a feature of Commonwealth Technical Training Week.

Certain of the items on display are conventional forms of equipment used in general contracting work, but many are specially designed for railway civil engineering use. Some of the larger items of equipment were designed and developed by, or for, the North Eastern Region of British Railways, and are on view for the first time including two which are the only machines of their kind in the world. Visitors will be able to see some of the machines actually at work.

New British Railways colour films will also be on view.

CONTRACTS AND TENDERS

Snow blowers for the Spanish National Railways

Rolba A.G., Zurich, Switzerland, has recently received an order for two snow blowers for use on the tracks of the Spanish National Railways. This order comprises two rail-carriages driven by diesel engines and equipped with Rolba rotary snow ploughs; one is intended for the normal railway network, and the other for a mountain railway. These two machines, weighing 25 tons and 20 tons respectively, will be built entirely in Switzerland, and will be delivered in the summer of 1962.

BOARD OF TRADE

The Export Services Branch, Board of Trade, has received calls for tenders as follows:

From Portuguese East Africa:

200 tarpaulins suitable for covering goods on railway wagons.

The issuing authority is the Ports, Railways & Transport Department, Lourenco Marques, to which bids should be sent. The tender No. is 69/AB/CFM/61. The closing date is June 7, 1961. The Board of Trade reference is ESB/13626/61. No further information is available at the Board of Trade.

300 seamless rolled steel pipes, galvanised on the inside, with the following dimensions: length, 4.270 m., outside dia., 0.05 m., inside dia., 0.04 m., wall thickness, 0.005 m.

The issuing authority is Ports, Railways & Transport Department, Lourenco Marques, to which bids should be sent. The tender No. is 126/61. The closing date is June 8, 1961. The Board of Trade reference is ESB/15229/61.

1,500 m. conveyor belt for the mineral conveyor of the port of Beira.

The issuing authority is the Ports, Railways & Transport Department, Lourenco Marques, to which bids should be sent. The tender No. is 71/AB/CFM/61. The closing date is June 28, 1961. The Board of Trade reference is ESB/15226/61. No further information is available at the Board of Trade.

50 chains for tying bulky goods to railway wagons.

The issuing authority is the Ports, Railways & Transport Department, Lourenco Marques, to which bids should be sent. The tender No. is 61/AB/CFM/61. The closing date is May 19, 1961. The Board of Trade reference is ESB/13625/61. No further information is available from the Board of Trade.

Elaboration of the final project and construction of four blocks of four residential flats at Mahotas for the staff of the Mozambique State Railways.

The issuing authority is the Ports, Railways

& Transport Department, Lourenco Marques, to which bids should be sent. The closing date is June 12, 1961. The Board of Trade reference is ESB/13624/61. No further information is available at the Board of Trade.

From Sudan:

1 electric motor-driven air-cooled vacuum exhauster capable of creating and maintaining a vacuum of 28-in. of Hg. The capacity shall be 5,000 cu. ft. per hr. of pump displacement. Both rotary and reciprocating types will be considered. This exhauster is required for testing vacuum brakes fitted to our rolling stocks. The electric supply available is 415V. 3-phase 50 cycle, and the electric equipment shall comply with S.G. Specification 541 amended.

The issuing authority is Stores Department, Sudan Railways, Albara, to which bids should be sent. The tender No. is 2372. The closing date is June 8, 1961. The Board of Trade reference is ESB/13959/61. No further information is available at the Board of Trade.

- 3 riveting hammers
- 3 riveting hammers
- 2 chipping hammers
- 3 reversible rotary pneumatic drills
- 3 reversing rotary pneumatic drills.

The issuing authority is the Controller of Stores, Sudan Railways, Stores Department, Albara, to whom bids should be sent. The tender No. is 2367. The closing date is May 29, 1961. The Board of Trade reference is ESB/13621/61.

1,200 axle steel 9 in. x 4½ in. dia. journals for carriages and wagons in accordance with drawing No. 6100 and S.R. specification No. 412A (amended). Turning centres to be left in the axle.

The issuing authority is the Office of Controller of Stores, Sudan Railways, Stores Department, Atbara, to which bids should be sent. The tender No. is 2344. The closing date is June 15, 1961. The Board of Trade reference is ESB/15441/61.

From Pakistan:

718 steel mild sheets galvanised 8 ft. x 4 ft. x 1/16 in. to S. & D. specification. No. G/Metal/7 (special quality).

The issuing authority is the Chief Controller of Stores, Pakistan Eastern Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P2/GB4/106/60/ACST. The closing date is June 15, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/13189/61.

540,000 ft. covered electrodes for general repair work, including M.S. plate and sheet metal welding where high quality and good finishing is required as per CME/P.E. Rly./PHT's catalogue No. 6/EB4/Electrodes sheets No. 2, Class "B" 12 SWG.

The issuing authority is the Pakistan Eastern Railway, Pahartali, Chittagong,

to which bids should be sent. The tender No. is P5/ACST/EB4/9/60. The closing date is June 15, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/13632/61. No further information is available at the Board of Trade.

42 cylinders vacuum "F" type 24 in. complete (but without piston rod and its fittings) as per IRS drawing No. VBA-16 and PRSS No. R-3 (for broad gauge 68 ft. bogie under frames and B. & NG locos.).

The issuing authority is the Chief Controller of Stores, Pakistan Eastern Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P5/EVB/42/60. The closing date is May 29, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/15272/61.

2 forward control long wheelbase (approx. 13 ft. 6 in.) 5-ton diesel trucks with steel factory built cabs, body side approx. 1 ft. 6 in. high, body sides hinged to provide flat when dropped and all standard equipment, complete with tools, maintenance manual and parts catalogue. The tenderers should also quote for essential spares of these vehicles to cover up 2 years' requirements itemwise separately.

The issuing authority is the Chief Controller of Stores, Pakistan Eastern Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P5/EC2/109/60. The closing date is May 29, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/15272/61.

3,100 superior hand-signal Kerosene oil lamps.

The issuing authority is the Pakistan Western Railway, Empress Road, Lahore, to which bids should be sent. The tender No. is P-58/P3/3-61. The closing date is May 20, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/13690/61. No further information is available at the Board of Trade.

1,500 links MS coupling for buffer finished (MG) as per drawing No. W/642 alt. (1) and PRSS No. R12-49 (Steel Class IV).

The issuing authority is the Pakistan Eastern Railway, Pahartali, Chittagong, to which bids should be sent. The tender No. P5/ACST/EB1/10/60. The closing date is June 3, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/13926/61.

4,500 pins HTS, yoke complete with washers and split pins for coupling 6½ in. x 1½ in. (MG) as per IRS drawing No. W/646 alt. (1) and PRSS No. R12/49.

The issuing authority is the Pakistan Eastern Railway, Pahartali, Chittagong, to which bids should be sent. The tender No. is P5/ACST/EB1/19/60. The closing date is June 3, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/13927/61.

700 screw couplings high tensile steel for BG carriage and wagon complete to IRS drawing No. WA/1 alt. (5) and PRSS No. R9-49.

The issuing authority is the Pakistan Eastern Railway, Pahartali, Chittagong, to which bids should be sent. The tender No. is P5/ACST/EBI/3/59. The closing date is June 3, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/13928/61. No further information is available at the Board of Trade.

614 tubes, steel flue, P.S. & R.S. 12 ft. 1 in. x 5½ in. to drawing No. 2-A-18 Alt. 2.

The issuing authority is the Chief Controller of Stores, Pakistan Eastern Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P6/EA1/59/ACST. The closing date is May 31, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/14914/61.

From Iraq :

6000 standard gauge sleepers
50,000 metre wooden sleepers.

The issuing authority is the Director-General, Iraqi Republican Railways, Baghdad West, to whom bids should be sent. The closing date is May 21, 1961. The Board of Trade reference is ESB/12921/61. No further information is available at the Board of Trade.

From Egypt :

Supply of three automatic compound weighbridges, force 200 ton.

The issuing authority is the Engineering Department, Way & Works, Egyptian Republic Railways, Ramsis Square, Cairo, to which bids should be sent. The tender No. is 380/93/1. The closing date is June 15, 1961. The Board of Trade reference is ESB/13182/61. No further information is available at the Board of Trade.

From South Africa :

18 portable V.H.F. radio telephones
6 canvas bags
6 battery chargers
4 sets of test equipment
4 sets of spares.

The issuing authority is the Stores Department, South African Railways. Local representation is essential. The tender No. is C.8641 : V.H.F. Radio Telephones. The closing date is June 23, 1961. The Board of Trade reference is ESB/15255/61. No further information is available at the Board of Trade.

Two 25/5 ton overhead electric travelling cranes

Two 65 in. dia. "hook-on" type lifting magnets.

The issuing authority is the Stores Department, South African Railways. Bids in sealed envelopes, endorsed "Tender No. C.8564. O.E.T. Cranes" should be addressed to the Chairman of the Tender Board, P.O. Box 7784, Johannesburg. Local representation is essential. The closing date is June 9, 1961. The Board of Trade reference is ESB/15254/61.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

BEYER, PEACOCK & CO. LTD.

(Locomotive Builders and General Engineers)

Mr. Harold Wilmot's survey of widespread activities

The annual general meeting of Beyer, Peacock & Co. Ltd. was held on May 17 in London, Mr. Harold Wilmot, C.B.E. (Chairman) presiding.

The following is an extract from his circulated review:—

In 1960 the working of the holding company type of structure which was instituted in the previous year, and the organisation of the Group as a whole, has brought some improvements in our operations and given indications of useful further development.

With Beyer, Peacock & Co. Ltd. as the holding company all the other companies are grouped under five principal subsidiaries, i.e., Beyer Peacock Gorton Limited, Richard Garrett Engineering Works Limited, Denings of Chard Limited, Anti-Attrition Metal Co. Ltd., and Air Control Installations Limited. These are the major operating companies (excluding, of course, our associated company Beyer Peacock (Hymek) Limited). Each of the five groups has made a profit in 1960.

The reorganisation of the factory at Gorton is complete with regard to the change-over of productive facilities from being wholly steam to being predominantly diesel traction. The first of a series of 95 main-line diesel-hydraulic locomotives ordered by the British Transport Commission successfully underwent its trials approximately three months ahead of schedule and it is more than gratifying to be able to report that our first major effort in this field has commenced so smoothly. Great credit for this must be given to Mr. James Hadfield and executives at Manchester, and to our Hymek partners—Bristol Siddeley Engines Limited, and J. Stone & Co. (Deptford) Ltd. After all that has been said in the press and elsewhere concerning late deliveries by British manufacturers I feel that shareholders will like to know the degree of success of your own company in this connection.

As I indicated last year, the Richard Garrett Engineering Works of Leiston have increased their production of machine tools and have also made deliveries of some new machinery (which is applicable to the packaging and cartoning industry) as a result of a 20-year agreement we have made with the S. & S. Corrugated Paper Machinery Co Inc. of Brooklyn, New York. Your board feel that the packaging industry has considerable expansion ahead of it and entry into this field in collaboration with one of the American leaders is likely, over a long term, to be highly advantageous to our group and to be a significant group export contribution.

The agricultural equipment industry has suffered in 1960 by reason of the credit squeeze imposed by the Chancellor. It was, therefore, vital to fill the obvious gaps by additional export work and our efforts in this direction were satisfactory.

Anti-Attrition Metal Co. Ltd. emerged

at the end of 1960 with a result considerably better than the previous year. I reported to the shareholders of Anti-Attrition when their accounts were recently posted to shareholders that although by means of increased sales pressure our total turnover for the year was increased, this was at the expense of profit margins. The board of that company is considering by what means the fortunes of Anti-Attrition can be still further improved.

With regard to Air Control Installations Limited's activities I am pleased to be able to say that the licence agreement we made with Svenska Flaktfabriken of Stockholm, Sweden, in connection with their "Velovent" high velocity system for air conditioning is showing every indication not only of adding to our range of production but also of being satisfactory in the financial sense.

You are aware that until recent times our Gorton Works was fully engaged on the production of main-line Beyer-Garratt steam locomotives. We were, nevertheless, not slow to appreciate that the modern trend in railway operation was away from steam and towards diesel and electric traction and we formulated our long-term plans accordingly. In consequence, as our Gorton Works was fully occupied in the construction of Beyer-Garratt locomotives, the Metropolitan-Vickers-Beyer, Peacock Company was formed some 11 years ago for the purpose of manufacturing diesel electric and straight electric locomotives.

In view of the reduced demand for steam locomotives, our Gorton Works has been re-organised and is now capable of meeting all foreseeable demands on your company for steam, diesel and electric locomotives, so that the capacity at Stockton-on-Tees has become surplus to our requirements. We have, therefore, along with our partners in this enterprise, decided to place the Metropolitan-Vickers-Beyer, Peacock Company in voluntary liquidation.

In summarising the results of 1960 I think I can say that the forecast I made last year has been borne out by the events. I see no reason to expect that the results for 1961 will not be at least as good as those for 1960.

On December 31, 1960, I came to the end of my service contract as Managing Director of Beyer Peacock & Co. Ltd., having attained the age of 65. As a result of this the Board have appointed Mr. James Hadfield, M.B.E., to be Managing Director of the Holding Company, and to be either Chairman and/or Managing Director of a number of the other subsidiaries.

The report and accounts were adopted.

Midland Railway Co. of Western Australia Ltd.

Sir Robert Adeane, Chairman of the Midland Railway Co. of Western Australia Limited, in his statement for the annual general meeting on May 16, said he regretted to report the death in August last of Mr. David Brisbane, who had joined the company as General Manager during the latter

years of the war. After the war he had done much to rehabilitate the railway.

Sir Ross McDonald, who had been a local director, had accepted the chairmanship of the local board. Mr. Dowson, who had been General Manager for the past 11 years, had joined Mr. Holmes as a local director.

Gross receipts were up by £89,000 compared with the previous year, and working expenses increased by £39,000, leaving net receipts higher by £50,000. Total goods ton-mileage at 39,200,000 showed an increase of 15 per cent compared with the previous year. Part of the increase in working expenses was due to the greater volume of traffic, but more than one-third arose from increases in wage rates awarded during the year. Expenditure on renewals was considerably less than the amount expended last year, and the provision for renewals and deferred maintenance was of necessity higher. A great deal of renewal work still remained to be done before the programme of rehabilitation was complete.

Results for the first half of the current financial year were better than those of the corresponding period of last year. Gross receipts showed an improvement of £48,000, working expenses were up by £26,000, making net receipts £22,000 more for the half-year ended on December 31 last. The second half of the year opened with less promise, and preliminary returns indicated that net receipts for the two months from January 1 to the end of February last would be about £5,000 down, compared with the corresponding period of 1960.

NOTES AND NEWS

Re-arranged meeting. The meeting originally arranged by the Institution of Civil Engineers for May 9, to hear about the design and building of Auckland Harbour bridge has been re-arranged for June 1.

Metropolitan railway and fares. In the article in our issue of May 12, although we originally attributed the paper entitled "The place of the metropolitan railways in urban public transport" to Mr. B. H. Harbour, we unfortunately referred to him as "Mr. Hubbard" later in the article. It was, of course, Mr. Harbour's paper.

New kite-mark licensee. British Indicators (Sales) Limited has been granted a licence by the British Standards Institution to apply the kite-mark to their range of dial gauges for linear measurement manufactured in accordance with B.S.907.

Scottish Region potato forwardings. Last autumn, the Scottish Region of British Railways, dispatched more than 204,000 tons of seed potatoes in the seven-month season. From the Aberdeen area alone, 3,800 wagons carried 27,000 tons of seed potatoes, while in the Inverness area it is anticipated that forwardings this season will exceed those for

last year. The precautions taken to avoid damage to the potatoes have resulted in an almost complete absence of claims.

Mechanical Handling Exhibition. The next exhibition will be held at Earls Court, London, S.W.5, May 8-18, 1962. Space is said to be already almost completely taken up.

Dunlop depot at Southampton. The Dunlop Rubber Co. Ltd., has opened a new and larger depot on the Millbrook Trading Estate at Southampton. The District Manager is Mr. E. J. Garland, his deputy is Mr. H. A. Davies. Mr. R. Hancock is the Depot Manager.

Sunday coach trips. The London Transport Executive are to run cheap Sunday coach trips, starting May 21, to the main pleasure spots round London. A network of 48 special routes will operate at a fare of a penny a mile and seats will be bookable in advance. A list of the trips will be available from the L.T.E.

New company formed. L. Schuler A.G. of Germany, and Wickman Limited, Coventry, have announced the formation of a jointly owned British company to be called Schuler Presses Limited. The company has been formed to establish the manufacture of certain Schuler presses in the United Kingdom and to provide a U.K. based engineering and after-sales service to all Schuler press users.

Jinja-Bukonte line opening. At the opening of the Jinja-Bukonte line, to which editorial reference was made in our issue of May 5, a table lamp was presented to His Excellency the Governor of Uganda, Sir Frederick Crawford, by the General Manager of The East African Railways & Harbours, Sir James Farquharson. The photograph below shows the presentation being made. The

shade of the lamp depicts the various places at which Sir Frederick Crawford has been stationed during his 32 years service.

Railway cottage homes. Twenty newly erected flats at Hull, built by British Railways North Eastern Railway Cottage Homes & Benefit Fund, were opened on May 6. Mrs. A. Newton Thorpe, widow of the designer, who was architect to the Fund, and Mrs. L. M. Sayers, wife of the Assistant General Manager (Administration), North Eastern Region, performed the ceremony.

Closure of West Halton Goods Station. The Eastern Region of British Railways has announced that on and from May 29 the freight train service will be withdrawn from West Halton Goods Station, near Scunthorpe. Facilities will continue to be available for the collection and delivery of parcels and freight sundries traffic. Full wagon loads of freight will be dealt with at Winterton & Thealby Station.

New rail-traction diesel. The new 16-cylinder vee engine, designed by the Société D'études de Machines Thermiques, and built by the Société Générale de Constructions Mécaniques, is reported to have successfully undergone tests to U.I.C. specification 623 OR. The S.N.C.F. has already ordered 23 engines of this type for locomotives of 2,000 h.p.

Weed-control conference. In view of the growing need to establish the economic importance of controlling unwanted vegetation, and of the importance of making known the latest developments, a conference on industrial weed-control has been arranged. The British Weed Control Council, in conjunction with the Pesticides Group of the Society of Chemical Industry, has organised a one-day symposium on June 30, 1961, in the Assembly Hall of the Royal Commonwealth Society, Northumberland Avenue, London, W.C.2. Among the



Sir James Farquharson making the presentation at the opening of the Jinja-Bukonte line



Sir James Farquharson, General Manager, East African Railways & Harbours, receiving the silver ashtrays presented on his retirement

subjects which will receive consideration is weed control on railways, docks and harbours. Registration forms are available from the Secretary, 52 Bedford Row, London, W.C.1.

New bearing company in India. The Sefko Ball Bearing Co. Ltd. has announced the formation, in India, of a new company to be known as The Associated Bearing Co. Ltd.

Sudan seeks loan. A proposed loan of £6 million to the Sudan from the World Bank will, if obtained, be used to buy diesel locomotives for Sudan Railways and for the expansion of Port Sudan harbour.

Victoria coach stop. An improved Central London boarding and alighting point for Green Line coaches was brought into use on May 3 at Eccleston Bridge, Buckingham Palace Road, behind Victoria station.

More visitors in February. Overseas visitors to Britain in February totalled 59,000, an increase of 12 per cent on the same month last year, according to the British Travel & Holidays Association. There were 28,000 European visitors during the month, 13 per cent more than February, 1960. Visitors from the United States in February increased by 2 per cent to 10,150.

Athol Street garage closed. The London Transport Executive has closed the 82-year-old bus garage at Athol Street, Poplar. The land on which it was situated is required for redevelopment, including road improvements. Vehicles and crews that operated from Athol Street now work out of Poplar garage, a former trolleybus depot, converted and used as a bus garage since November, 1959.

London Midland ambulance competition. The finals of the London Midland Region ambulance competition were held at Belle Vue, Manchester, on May 10. The men's final was won by a team from Camden goods station and Dublin No. 1 team was placed second. In the Women's Competition, Earlestown won the team test and Nottingham the "pairs." The successful teams will take

part in the inter-regional competition in London on May 25.

Factory extension. Northey Rotary Compressors Limited has announced that owing to a large expansion in railway orders their factory premises have been doubled in extent. The company, has just completed an order for 21 exhausters, for the first electric locomotives to be built by the Indian Government.

Reduced fare Holiday Period rail tickets. The Eastern Region of British Railways has stated that reduced fare holiday period tickets to certain resorts on the Lincolnshire coast and in East Anglia will be issued this year until October 26.

R.C.H.S. annual general meeting. The sixth annual general meeting of the Railway & Canal Historical Society was held in Chester on May 6 during the course of a weekend of visits. The visits included a trip on the Trent, Mersey, and Bridgewater canals, a road tour of Wirral railways, and a visit to Cathcart Street goods station and other railway buildings in the Birkenhead area.

Measuring equipment distributors. Matchless Machines Limited (Tesa Division) has announced that the following companies have been appointed area distributors for Tesa high precision measuring equipment:—Stuarts & Houston, 5 York Street, Glasgow, C.2, for the whole of Scotland, and Batesons Limited, 105-111 Yorkshire Street, Rochdale, for Rochdale and surrounding area.

Presentation to Sir James Farquharson. Sir James Farquharson, General Manager, East African Railways & Harbours, was presented with three inscribed silver ashtrays, to mark his retirement, on behalf of members of the Transport Advisory Council, Railway Committee, and Harbour Committee, by Sir Alfred Vincent. The photograph above shows, left to right, Sir Amar Maini, Speaker, Central Legislative Assembly; Mr. A. H. Jamal, Minister for Communications, Power & Works, Tanganyika; Sir James Farquharson; Sir Alfred Vincent,

Member, Transport Advisory Council; Lt.-Col. S. G. Ghersie; Mr. G. A. Tyson; Chief H. M. Ingusha; Mr. N. K. Laxman, and at the back, Mr. G. Mackay, Deputy General Manager, E.A.R. & H.

Manufacturers meet Minister of Transport. Representatives of the National Union of Manufacturers met Mr. E. Marples, Minister of Transport, on May 11, to give their views about Government proposals in the White Paper on the Reorganisation of the Nationalised Transport Undertakings.

Stoke-on-Trent freight terminal. The London Midland Region of British Railways has opened a new freight terminal at Stoke-on-Trent to deal with traffic previously handled at Stoke-on-Trent, Hanley, Longport, Longton, Newcastle under Lyme, Leek, Stone, Congleton, and Stafford.

Trade with East Germany. British trade with East Germany totalled £5,335,306 for the first three months of 1961, an impressive increase, according to figures published by the Board of Trade. British exports to East Germany at £2,350,554 were up nearly three times compared with 1959 and British exports and re-exports together were three times as large as East German exports to Great Britain.

Warning poster. The Scottish Region of British Railways has issued a poster to stress the danger to children trespassing on railway property, particularly on electrified lines. The poster tells children that overhead electric wires must always be treated as "live," that anyone who goes near those wires is in danger, and the danger that exists if children climb or go too close to masts and equipment carrying overhead wires. The poster has been distributed to schools.

Railway management courses. A new series of railway management courses was inaugurated by Mr. David Blee, General Manager, London Midland Region of British Railways on May 15. Each five-week course at the School of Transport, Derby, will be attended by 32 railwaymen.

Pondicheri Railway Co. Ltd. An extraordinary general meeting of the Pondicheri Railway Co. Ltd., has been called for June 5, to consider a resolution to wind up the company voluntarily and to appoint Mr. C. G. Brown, chartered accountant, as liquidator.

B.I.C.C. supplies cables for Moscow Fair. Among the firms exhibiting in Sokolniki Park will be Telcon Metals Limited, on whose stand the products of Thomas Bolton & Sons Ltd., Connollys (Blackley) Limited, and other members of the British Insulated Callender's Cables Limited group of companies will also be shown. In addition, the B.I.C.C. group is one of the few concerns to have supplied major equipment essential to the actual construction and operation of the Fair. With the exception of the stand sub-circuits, B.I.C.C. has supplied all the cables for the electrical distribution at the Fair, totalling over three miles in length, as well as accessories.

Railway Stock Market

Although there were signs of a pause in the market upswing, business remained on a substantial scale, and it is not surprising that, after recent big gains, some leading industrial shares have encountered a fair amount of profit-taking. The City is trying to assess the implications if Britain were to link up with the European common market countries, but everything would turn on the basis of any development of this kind. It seems that the prevailing view among stockbrokers is that there would be a big expansion in demand for British shares by Continental investors.

Among foreign rails, Costa Rica ordinary stock again attracted attention on encouraging views of future scope for capital appreciation, and, compared with a week ago, the price has risen on balance from 41½ to 44½; the first debentures were 96½ and the second debentures 125. Chilean Northern 5 per cent first debentures were 50. Brazil Railway bonds eased from 4½ to 4, while Paraguay Central prior debentures were 18.

International of Central America common shares remained at the lower level of \$19 recorded a week ago, while the preferred stock came back further from \$110½ to \$107½.

United of Havana second income stock remained at 5½; business in the consolidated stock was recorded up to 25s.

Antofagasta ordinary stock firmed up from 15½ to 15½, but the preference stock lost a point at 32; the 4 per cent perpetual debentures were 43½. Mexican Central "A" bearer debentures kept at 58½, and San Paulo Railway 3s. units were again around 1s.

Canadian Pacifics rose further on balance from \$46½ a week ago to \$47. The 4 per cent preference stock came back from 61½ to 60, and the 4 per cent debentures from 58½ to 56½. White Pass shares were \$9½.

Nyasaland Railways shares remained at 11s. with the 3½ per cent debentures 35xd. West of India Portuguese capital stock was 116½ and Barsi 17.

There has been a number of features among shares of locomotive builders and engineers, notably Beyer Peacock 5s. shares, which remained under the influence of satis-

faction with the results, and have risen further from 8s. 3d. to 9s. 3d. Charles Roberts 5s. shares kept at 8s. 3d. and G. D. Peters at 18s. 9d. Moreover, Birmingham Wagon, after reacting, rallied and at 32s. were at the same level as a week ago. North British Loco. have been firm at 9s. 3d. Gloucester Wagon 10s. shares were 10s. 3d. and Wagon Repairs 5s. shares moved up from 20s. to 20s. 3d. Westinghouse have been a feature of strength at 44s. 9d. compared with 43s. 9d. a week ago.

Among machine tools, Alfred Herbert were up to 79s. 6d. with Asquith 5s. shares 12s. 6d. and Wolf Tool 5s. shares 17s. 6d. "ex" rights to the new shares. Guest Keen advanced further to 108s. 6d. on further consideration of the results, and T. W. Ward were good at 82s. with Ruston & Hornsby well maintained at 30s. 9d.

In electricals, Mather & Platt came back from 43s. 6d. to 42s. 9d. A.E.I. at 42s. 6d. compared with 42s. 9d. a week ago, G.E.C. rallied from 36s. 3d. to 38s. 3d. and English Electric at 34s. compared with 35s. 6d. B.I.C.C. helped by the big success of the debenture issue, have been firm at 59s. 3d. x.d. British Oxygen 5s. units were 27s. 6d. "ex" the scrip issue. Tube Investments have been firm at 80s. 9d. and Leyland Motors were 98s. 7½d. Pressed Steel 5s. shares were 28s. x.d. with Dowty Group 10s. shares 39s. 10½d. Pollard Bearing 4s. shares were quite well maintained at 43s. 3d. and Ransome & Marles 5s. shares rallied from 19s. 6d. to 20s. 9d. Vickers, helped by the good impression created by the annual report, rose to 37s. 3d. the assumption being that there are good prospects of the 10 per cent dividend being maintained for the current year.

Forthcoming Meetings

May 20 (Sat.). The Stephenson Locomotive Society, Dundee Centre, Angus Rail Tour.

May 25 (Thu.). The Institution of Electrical Engineers, Utilisation Section, at Savoy Place, London, W.C.2, at 5.30 p.m. Annual lecture on "Electric traction," Mr. J. A. Broughall.

May 26 (Fri.). Indian and Pakistan Railways annual re-union dinner, at the Rembrandt Rooms, Brompton Road, S.W.7, at 7 p.m.

May 26-28 (Fri.-Sun.). The Institute of Traffic Administration, annual conference for 1961, at the Grand Hotel, Folkestone.

May 30 (Tue.). The Institution of Civil Engineers, at Great George Street, Westminster, S.W.1, at 5.30 p.m. The Unwin Memorial Lecture: "The work of the Institution's Research Committee," Professor J. F. Baker.

June 1 (Thu.). The Institution of Civil Engineers at Great George Street, London, S.W.1, at 5.30 p.m. "Auckland Harbour bridge: design," Mr. G. Roberts and Mr. A. O. Kerensky, and "Auckland Harbour bridge: construction," Mr. H. Shirley Smith and Mr. J. F. Pain. (Rearranged from May 9.)

June 3-8 (Sat.-Thu.). The Permanent Way Institution, annual summer convention, at Newcastle upon Tyne.

June 5 (Mon.). The Historical Model Railway Society, London section at Keen House, Calshot Street, London, N.1, at

7 p.m. "The Settle & Carlisle Line," Mr. N. Wilkinson.

June 15 (Thu.). The Model Railway Club at Keen House, Calshot Street, London, N.1, at 7.45 p.m. "The Southwold Railway: Part 2—The Model." A talk by Mr. E. R. Boston.

June 15-24 (Thu.-Sat.). International Construction Equipment Exhibition, Crystal Palace, London.

OFFICIAL NOTICES

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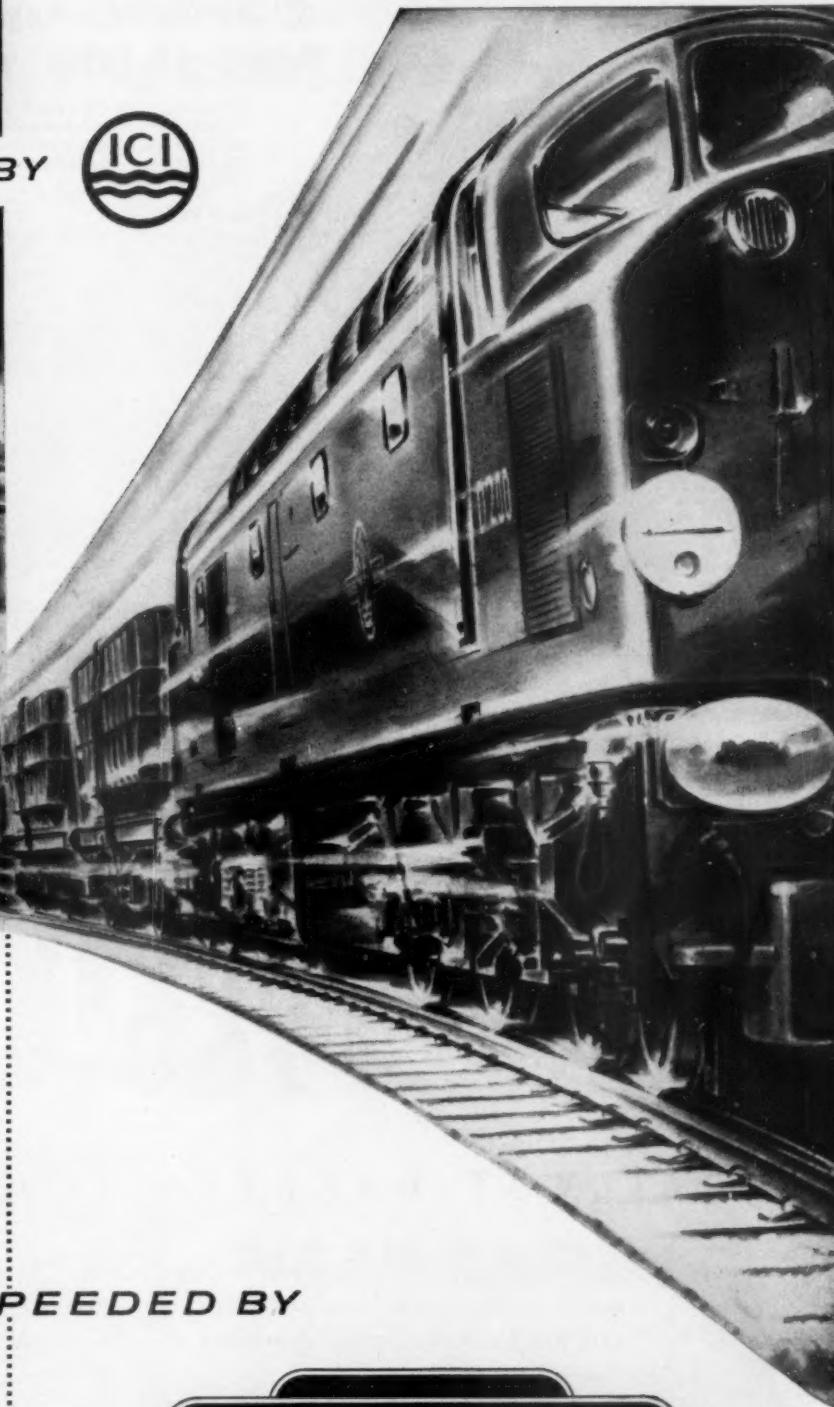
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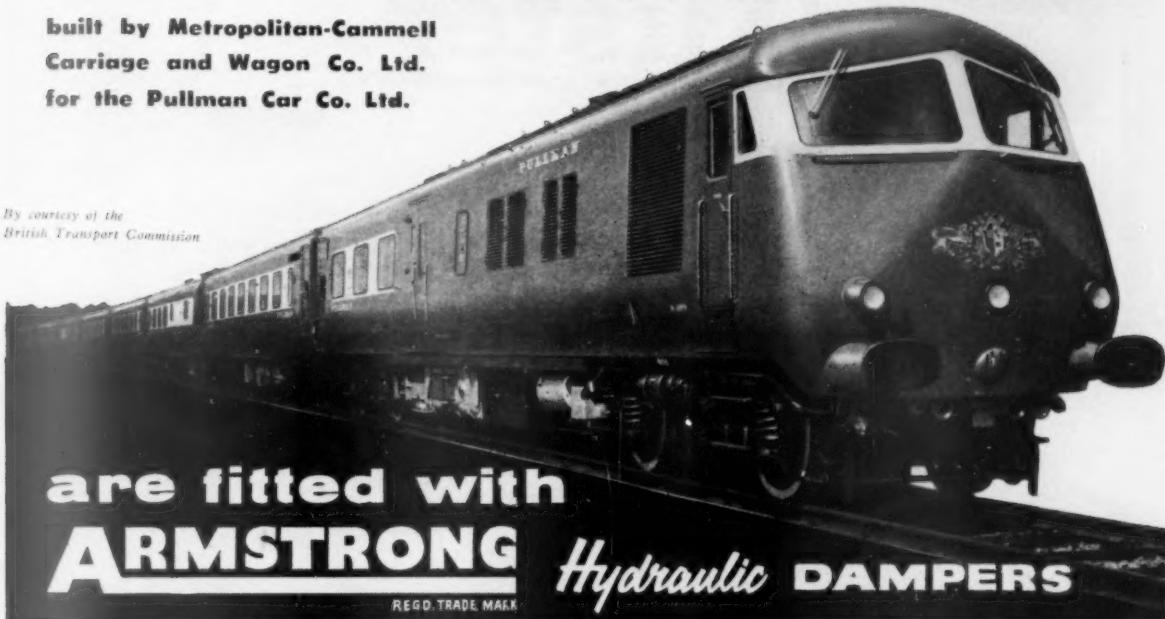
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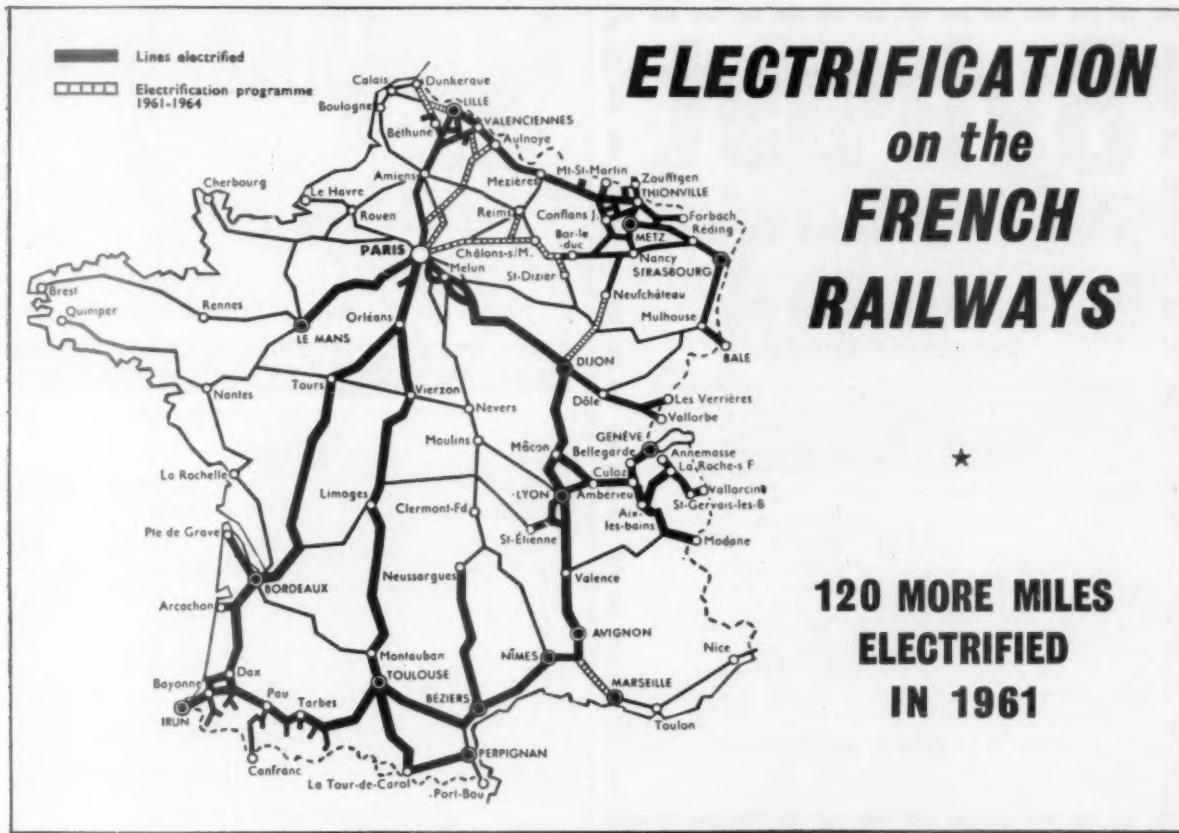
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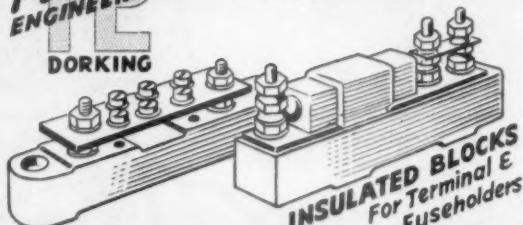
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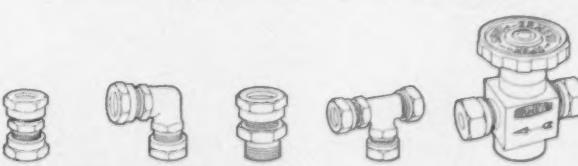


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HRG

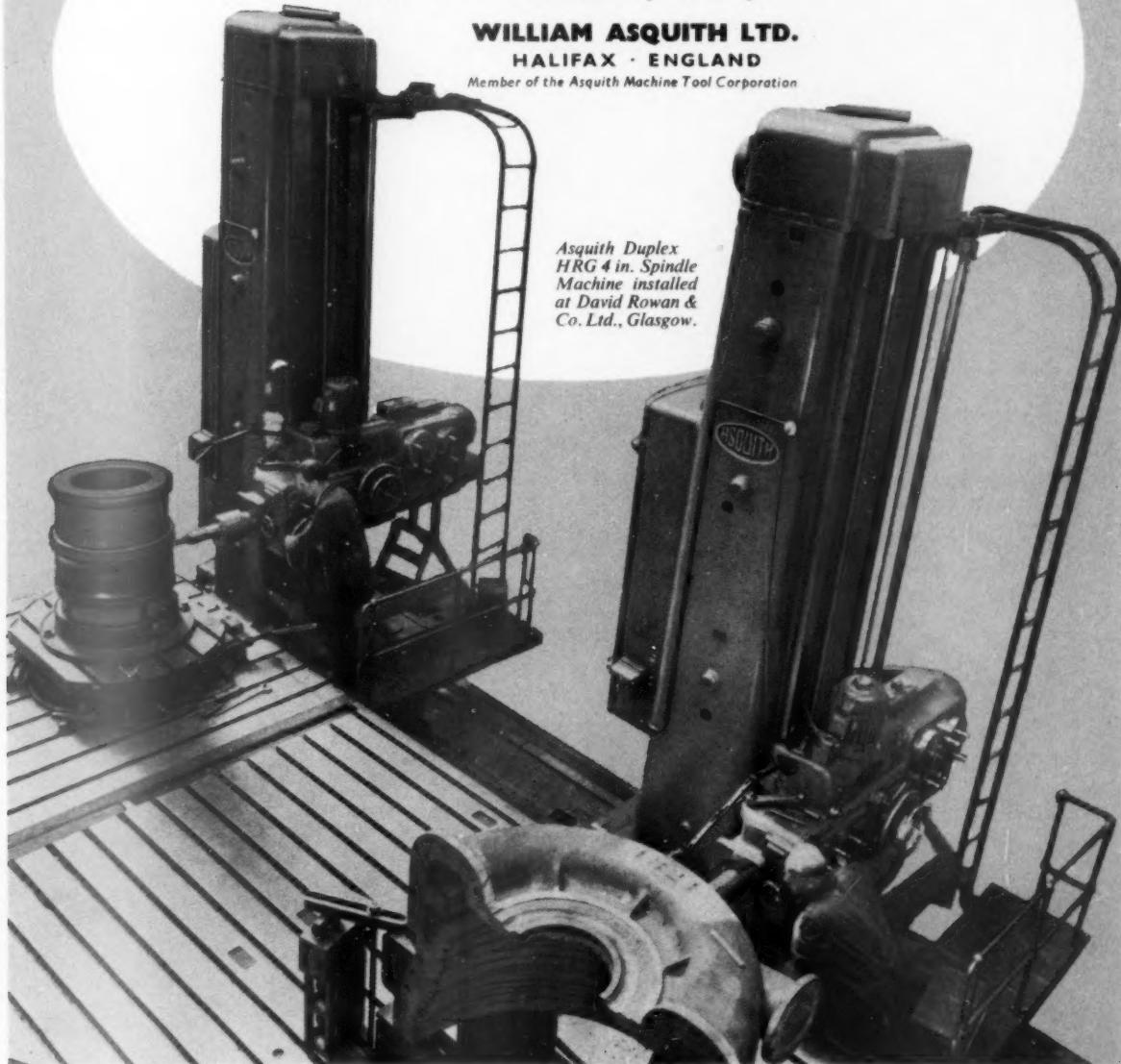
Many installations of HRG type horizontal borers are proof of its popularity for a wide range of general engineering work. It is a 4 in. spindle machine with 10 h.p. main driving motor. In addition to the fine hand adjustment and variable self-acting milling feeds, the slide is provided with quick power traverse to vertical motions. Ease and rapidity of handling are outstanding features that ensure maximum productivity.

WILLIAM ASQUITH LTD.

HALIFAX · ENGLAND

Member of the Asquith Machine Tool Corporation

Asquith Duplex
HRG 4 in. Spindle
Machine installed
at David Rowan &
Co. Ltd., Glasgow.



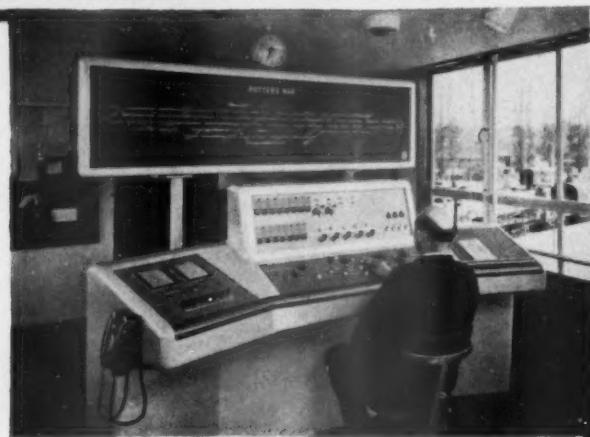
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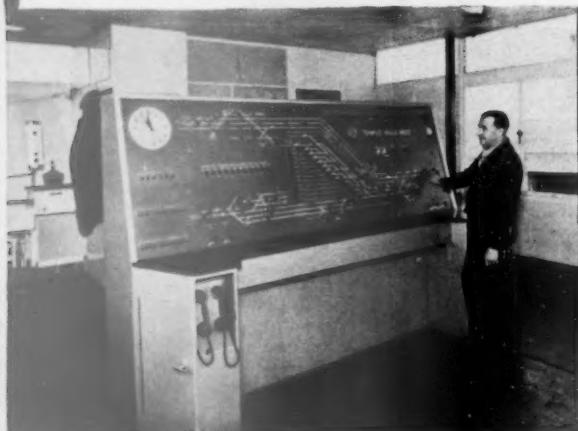
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KING EDWARD HOUSE, NEW ST., BIRMINGHAM Phone: Midland 3431. Also at LONDON Phone: Trafalgar 7224 & GLASGOW Phone: Central 0922

Originators
of two
simple movements
to clear the route



NX ROUTE RELAY INTERLOCKING



1 *Console and illuminated diagram installed at Potters Bar, British Railways, Eastern Region.*

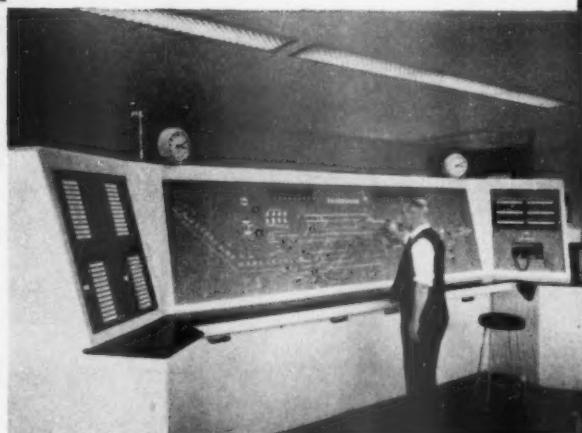
2 *Control panel at Temple Mills West, British Railways, Eastern Region, operating signalling and interlocking for the west end of Temple Mills Marshalling Yard.*

3 *Control panel at Faversham, British Railways, Southern Region, controlling signalling at Faversham Station and the junction for the Canterbury, Margate and Ramsgate lines. Photographs by courtesy of British Railways.*

For further details of the above installations, write to the address below:

AEI

For speeding up traffic and reducing manpower requirements, the NX (eNtrance/eXit) system of train control provides a safe, efficient and simple method of power signalling. Two simple movements set all necessary points and clear signals for a complete route.



AEI

Associated Electrical Industries—GRS Ltd.
132-135 LONG ACRE, LONDON W.C.2.

TEMPLE BAR 3444

AEI—GRS Equipment for Railways

